KY COUNCIL ON POSTSECONDARY EDUCATION
ACADEMIC & STRATEGIC INITIATIVES COMMITTEE

June 8, 2021 – 10:00 AM ET
ZOOM teleconferencing for Committee members
Public Link: https://www.youtube.com/c/KentuckyCouncilOnPostsecondaryEducationFrankfort

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10:00-11:15 a.m.

I. Call to Order & Roll Call

II. Action Items

III. Discussion Items and Updates

11:15 a.m. - Noon

V. Adjournment

Next meeting: July 13, 2021 @ 10am ET

DRAFT MINUTES
Council on Postsecondary Education

Type: Academic & Strategic Initiatives Committee
Date: March 23, 2021
Time: 10:00 a.m. ET
Location: Virtual Meeting - Committee members by ZOOM, Public viewing hosted on CPE YouTube Page

CALL TO ORDER

The Academic & Strategic Initiatives Committee met Tuesday, March 23, 2021, at 10:00 a.m., ET. Pursuant to Executive Order 2020-243 and a memorandum issued by the Finance and Administration Cabinet dated March 16, 2020, and in an effort to prevent the spread of Novel Coronavirus (COVID-19), the Committee met utilizing a video teleconference. Members of the public were invited to view the meeting virtually on the CPE YouTube page. Committee Chair Lori Harper presided.

ATTENDENCE

Members were in attendance: Colby Birkes, Benjamin Brandstetter, Lori Harper, Lucas Mentzer, Vidya Ravichandran, and Robert Staat.

Members not in attendance: Muhammad Babar and Kevin Weaver.

Heather Faesy, CPE's senior associate for Board Relations, served as recorder of the meeting minutes.

APPROVAL OF THE MINUTES

The minutes of the February 1, 2021 meeting were approved as distributed.

JAMES GRAHAM BROWN FOUNDATION – KENTUCKY STUDENT SUCCESS COLLABORATIVE

The Council was notified at the end of February by the James Graham Brown Foundation that the agency has been awarded a three-year, $2.1 million grant to establish and implement the Kentucky Student Success Collaborative (KYSSC). CPE President Aaron Thompson discussed the project which will be the first

statewide student success center in the United States that works with both two- and four-year institutions while linked to the business community and state policy makers. It is fully aligned with the vision of CPE, the goals of the state's strategic agenda, and the state's efforts to increase educational attainment of Kentucky citizens. The KYSSC will emphasize improved outcomes for underrepresented students, accelerating and improving institutional interventions to narrow attainment gaps and improving pathways for students to complete college with career ready skills.

Committee members asked how they can support the work of this project and discussed ways the new statewide strategic agenda can be aligned to its goals.

PROPOSED NEW ACADEMIC PROGRAMS

Dr. Melissa Bell, CPE's Vice President for Academic Affairs and Student Success presented five proposed new academic programs for review and approval. KRS 164.020 (15) empowers the Council on Postsecondary Education to define and approve the offering of all postsecondary education technical, associate, baccalaureate, graduate, and professional degree, certificate, or diploma programs in the public postsecondary education institutions. Council staff reviewed the following proposed programs and recommended approval.

Eastern Kentucky University

Global Hospitality and Tourism (B.S.) CIP Code 52.0901
Presented by: Karina Christopher
This program provides two concentrations, Gastronomic Tourism and Sustainable Hospitality and students can obtain a career in hotel management, theme parks, restaurants, country clubs, agritourism, local breweries and wineries, along with many more. The approval request also includes two 24 hour University Certificates, which meet the needs of professionals currently working in hospitality and tourism sectors who wish to add specializations or depth of knowledge.

Instructional Design and Learning Technology (M.S.) CIP Code 13.0501
Presented by:
This program is designed to confer job readiness skills bound by applied theoretical frameworks related to the fields of instructional and eLearning design, corporate training, and performance management. The core of the program consists of courses that will help the student to master instructional design, to

analyze and make data-driven decisions, and afford them an opportunity for in-house or external internships.

MOTION: Mr. Lucas moved to approve the two proposed programs from Eastern Kentucky University. Dr. Staat seconded the motion.

VOTE: The motion passed.

University of Kentucky

Marketing (M.S.) CIP Code 52.1401
Presented by: Leslie Vincent
This program is a one-year graduate program designed to provide students with in-depth course work in key marketing topics. This program will include core content focused on the areas of: strategic marketing, marketing research, new product development, personal selling and sales management, consumer insights, marketing analytics and digital visualization, corporate social responsibility marketing communications, digital marketing, and branding.

Strategic Human Resource Management and Analytics (M.S.) CIP Code 52.1001
Presented by: Scott Soltis
This program is a one-year graduate program designed to provide students with in-depth course work in key marketing topics. This program will include core content focused on the areas of: strategic marketing, marketing research, new product development, personal selling and sales management, consumer insights, marketing analytics and digital visualization, corporate social responsibility marketing communications, digital marketing, and branding.

MOTION: Mr. Lucas moved to approve the two proposed programs from the University of Kentucky. Dr. Staat seconded the motion.

VOTE: The motion passed.

Western Kentucky University

Instructional Leadership, School Principal (MAED) CIP Code 13.0401
Presented by: Gary Houchens
This program include 30 credit hours and leads to a provisional certification to serve as a school principal or assistant principal. It includes the same coursework as the Rank I and certification only pathways and simply creates a

third pathway to the principalship besides Rank I and certification only. This returns the university to the same menu of principal pathways that existed prior to the 2013 statewide revision of principal certification programs.

MOTION: Mr. Lucas moved to approve the proposed program from Western Kentucky University. Mr. Brandstetter seconded the motion.

ACADEMIC PROGRAM REVIEW PROJECT RESULTS

KRS 164.020 (16) outlines the criteria for statewide academic program review, and is a key responsibility of the Council on Postsecondary Education. The process undertaken ensures that academic programs are consistent with state priorities and that public resources are used efficiently for the greater good of the Commonwealth.

In 2019, CPE contracted with Gray Associates to work with universities to review all baccalaureate programs. Gray Associates was selected partly based on their expertise in productivity and efficiency metrics. The firm also has access to multiple data sources, which assists the sophisticated analyses needed to guide the statewide program review.

Dr. Bell discussed the process undertaken and the data that was analyzed in the process, as well as presented the results of that review. She also stated that CPE will present a proposed revision to the academic program review policy that reflects needed changes at an upcoming meeting.

STATEWIDE STRATEGIC AGENDA DEVELOPMENT

The CPE is directed by KRS 164.020 to develop a statewide strategic agenda for the public postsecondary education system and revise it on a regular cycle. Development of the next statewide strategic agenda kicked-off at the committee's February 1, 2021 meeting.

Dr. Stephen Pruitt, President of the Southern Regional Education Board (SREB) presented on studies recently conducted on COVID's impact on Kentucky's future workforce as well as data for areas that state needs to focus additional efforts on, and he provided strategic recommendations to consider while developing the next statewide agenda.

DATA AND RESEARCH

Dr. David Mahan, Associate Vice President, Data, Research and Advanced Analytics, provided an update on upcoming research projects and provide an overview of the following recently released data reports:

- Education Sector Analysis, which looks at labor market information, program demand gap analysis and migration analysis for the education sector in Kentucky.
- Earnings Gap Based on Gender and Education in Kentucky, which examined the disparities in median lifetime earnings.

Dr. Mahan also demonstrated the interactivity of the newly released Multi-State Postsecondary Report (MSPSR). It was developed by Kentucky Center for Statistics in partnership with the Council on Postsecondary Education, the Ohio Education Research Center, and the Coleridge Initiative. The tool can be used by Kentucky colleges to analyze employment outcomes based on credentials and majors. Users can also search based on origin – whether graduates entered college as an in-state or out-of-state student.

2021 LEGISLATIVE UPDATE

Mr. Greg Rush, CPE's Senior Fellow and Legislative Liaison, provided an update of the 2021 legislative session, includes bills that had already been signed or were pending review by the Governor.

Mr. Travis Powell, CPE's Vice President and General Counsel, discussed bills that didn't pass during the session includes HB 145, HB 383, and HB 253.

ADJOURNMENT

The Academic & Strategic Initiatives Committee adjourned at 12:10 p.m., ET.

MINUTES REVIEWED AND APPROVED BY THE COMMITTEE: _____

DRAFT MINUTES
Council on Postsecondary Education

Type: Academic & Strategic Initiatives Committee
Date: April 23, 2021
Time: 10:00 a.m. ET
Location: Virtual Meeting - Committee members by ZOOM, Public viewing hosted on CPE YouTube Page

CALL TO ORDER

The Academic & Strategic Initiatives Committee met Friday, April 23, 2021, at 10:00 a.m., ET. Pursuant to Executive Order 2020-243 and a memorandum issued by the Finance and Administration Cabinet dated March 16, 2020, and in an effort to prevent the spread of Novel Coronavirus (COVID-19), the Committee met utilizing a video teleconference. Members of the public were invited to view the meeting virtually on the CPE YouTube page. Committee Chair Lori Harper presided.

ATTENDENCE

Members were in attendance: Colby Birkes, Lori Harper, Lucas Mentzer, Vidya Ravichandran, and Robert Staat. Both new members, Doris Thomas and Karyn Hoover also attended the meeting.

Members not in attendance: Muhammad Babar, Lucas Mentzer and Kevin Weaver.

Carrie Hodge, CPE's senior associate for Data and Advanced Analytics, provided the roll call and coordination activities. Heather Faesy, CPE's senior associate for Board Relations, recorded the meeting minutes after viewing the video replay.

STATEWIDE STRATEGIC AGENDA DEVELOPMENT

The CPE is directed by KRS 164.020 to develop a statewide strategic agenda for the public postsecondary education system and revise it on a regular cycle.

Ms. Lee Nimocks, CPE's Vice President and Chief of Staff, and Dr. David Mahan, CPE's Associate Vice President of Data and Advanced Analytics, provided a contextual review of the quantitative data that is driving the strategic agenda development process.

Policy Area 1: Opportunity

Mr. Mahan reviewed several data points including the in-state college going rate, undergraduate enrollment, and average net price. Council members discussed how the state can lead efforts to improve the “on-to-college" rate for recent high school graduates and encourage more adults to return and finish credentials or degrees.

Policy Area 2: Success

Mr. Mahan reviewed several data points including graduation rates and first-to-second year retention rates. Council members discussed how the state can lead efforts to ensure students of all backgrounds, races, income levels and geography successfully progress through postsecondary programs complete degrees or credentials, and ensure college remains financially accessible to all Kentuckians.

Policy Area 3: Impact

Mr. Mahan reviewed several data points including Kentucky’s education attainment rate and progress to goal, attainment gaps by race/ethnicity and credential level, and degrees and credentials conferred over the last five years. Council members discussed how the state can lead efforts to ensure more students graduate with the skills and knowledge to compete and succeed in the workforce, and how it can better align postsecondary programs with business and industry need.

ADJOURNMENT

The Academic & Strategic Initiatives Committee adjourned at 11:35 a.m., ET.

MINUTES REVIEWED AND APPROVED BY THE COMMITTEE: _____

TITLE: Cultural Competency Credential Certification Process

DESCRIPTION: Staff recommend approval of the Cultural Competency Credential Certification Process, and recommend final approval by the Council at its June 25, 2021 meeting.

PRESENTER: Dawn Offutt, CPE's Director of Diversity, Equity and Inclusion

BACKGROUND INFORMATION

The Kentucky Public Postsecondary Education Policy for Diversity, Equity & Inclusion states that in order to live and thrive on a diverse campus and in an increasingly diverse world, students, faculty, and staff must become culturally competent. Cultural competency provides individuals with the knowledge, skills, and attitudes to increase their effectiveness in relating across cultural differences and prepares them for life in increasingly diverse domestic and international environments. As part of their plans for diversity, equity, and inclusion, institutions must implement initiatives designed to increase the cultural competence of students, faculty, and staff.

CERTIFICATION FRAMEWORK & PROCESS

Based on the A4 Model of Cultural Competence, the certification has four categories:

1. Awareness (A1
2. Acknowledgement (A2)
3. Acceptance (A3)
4. Action (A4)

The ASI Committee reviewed the full framework at its January 2021 meeting, and since then the credential certification process has been finalized. See attachment A. Staff will review the highlights of the formal process and recommend the ASI Committee approve it, and recommend final approval by the full Council at its next scheduled business meeting.

Cultural Competency Credential Certification Process

Approved by Council: June 25, 2021 (tentative)

Effective Date: July 1, 2021

Introduction

The Kentucky Public Postsecondary Education Policy for Diversity, Equity, and Inclusion (the Policy) states that in order to live and thrive on a diverse campus and in an increasingly diverse world, students, faculty, and staff must become culturally competent. Cultural competency provides individuals with the knowledge, skills, and attitudes to increase their effectiveness in relating across cultural differences and prepares them for life in increasingly diverse domestic and international environments. As part of their plans for diversity, equity, and inclusion, institutions must implement initiatives designed to increase the cultural competence of students, faculty, and staff. The Policy identifies the creation of a cultural competency certificate program as one of the strategies an institution can implement in order to meet this goal.

In an effort to assist institutions in meeting this goal and to create a consistent statewide standard for competency and excellence in cultural competence, the Kentucky Council on Postsecondary Education (the Council) has created a process to certify that cultural competency microcredentials at individual institutions address certain student learning outcomes. Institutions may utilize this process to increase the cultural competence of their campus community and their graduates as they enter the workforce. The Council created a cultural competency certification workgroup consisting of faculty and staff representatives from both four-year and two-year institutions across the state. The workgroup identified the minimum competencies, associated module topics and learning objectives that comprise the content for the certification. The competencies, module topics, and learning objectives are supported by the A4 Model for Cultural Competence, which forms the underpinnings for the Council's comprehensive framework for cultural competence. The framework's mission is that students, faculty, staff, administrators, and Kentucky's public postsecondary institutions and communities will recognize their own responsibility to lead in a global society that promotes equity and justice.

In support of institutional efforts to meet the goals outlined in the Policy, the Council shall certify a micro-credential in cultural competence for institutions who recognize the benefits of a culturally competent campus, want to increase the effectiveness of their faculty and staff in relating across cultural differences and want to prepare students for life in increasingly diverse domestic and international environments. For the purposes of this process, micro-credentials for students are defined as "institutional acknowledgements of academic, evidenced-based competencies that result in essential skills (e.g., responsible conduct of research, public speaking, financial literacy, leadership, etc.) and may be part of college coursework, but may or may not be directly awarded university, college, department, and program credit." Micro-credentials may identify accomplishments in the non-credit offerings of the institution and complement classes, certificates, and degrees, but do not replace them. These credentials are essential because they can showcase performance, demonstrate skills, or translate academic competencies into terms that non-academic employers are familiar with and value. Micro-credentials can also be a value-add for faculty and staff. For this group, micro-credentials are

defined as “short, competency-based recognitions that demonstrate mastery in a particular area.”

A micro-credential allows a faculty or staff member to receive recognition after completing requirements from professional development.

The Council has created a process for certifying credentials in cultural competency at institutions who wish to align with statewide standards and award micro-credentials to faculty, staff, and students in recognition of completing the program. The Council supports the efforts of the institutions to increase the cultural competence of those in their campus community who wish to become more aware of their own cultural worldview; obtain knowledge of different cultural practices and worldviews; and gain the ability to interact with those from other cultures.

The benefits incurred on institutions through credential certification are as follows:

Neutral and independent third party verification. Beginning in 2016, CPE’s Kentucky Public Postsecondary Institution Policy for Diversity, Equity, and Inclusion has touted the benefits of cultural competence and its role in preparing students for living and working in an increasingly diverse world. It sets a goal for institutions to work toward producing culturally competent students, faculty, and staff. CPE’s focus and work in this area has been recognized statewide and nationally and its certification of the credential will carry substantial weight in academia and other workplaces. As described in more detail below, the CPE’s verification process will include an independent review team of experts and approval by one of CPE’s strategic committees.

Consistency, Currency, and Portability. Obtaining a cultural competency credential certified by CPE will indicate to undergraduate and graduate admissions officers and employers that recipients have obtained a common set of competencies in cultural competence understood and agreed to statewide. This will add an additional layer of currency beyond that which is already provided by the conferring institution. The standards required for certification are consistently communicated and promoted by CPE through multiple mediums and in numerous venues. Certified credentials will also be promoted by CPE in the same manner and with a master list of certified programs to be prominently displayed on the CPE website. This will allow recipients to communicate their receipt of the credential in educational venues and in the workplace and have more confidence that the significance of that credential is better understood.

Positioning Kentucky as Leader in Cultural Competence. As CPE continues to promote and educate on the value of cultural competence and its credential certification program, and as more credentials become certified, Kentucky will soon be seen nationally as a leader in this area. More and more each day business and industry are making diversity, equity, and inclusion a priority. Students across the Commonwealth and across the nation are seeking more knowledge in these areas and want to live and learn in diverse environments where equity and inclusion are of utmost importance. A Kentucky cultural competency credential certification process widely participated in by institutions across the state demonstrates not only the state’s commitment to diversity, equity, and inclusion, but an understanding actually how to put that commitment into practice.

A^4 Model for Cultural Competence Framework

For institutions who wish to have their cultural competency micro-credential certified by the Council, they must demonstrate its alignment with the A^4 Model for Cultural Competence. The A^4 Model for Cultural Competence is a framework designed to provide individuals with the knowledge, skills, and attitudes to increase their effectiveness in relating across cultural differences in increasingly diverse domestic and international environments. Each phase in the framework offers 1) a learning objective, which describes the on-going, long-term goal of the phase; 2) competencies which describe what the individual should be able to demonstrate upon completion of the phase and; 3) module topics that describe which aspects of cultural competence should be addressed within the phase.

Mission: Students, faculty, staff, administrators, and Kentucky's public post-secondary institutions and communities will recognize their own responsibility to lead in a global society that promotes equity and justice.

1. **Awareness (A^1)** – Learning Objective: Through on-going self-reflection, individuals will develop a better understanding of who they are, become more aware of human diversity and demonstrate a respect for the dignity of others.

   Competencies:
   - To define and differentiate key terms related to diversity
   - To increase self-awareness by defining one's own identity and comparing/contrasting one's identity with others

   Module Topics shall include, at a minimum:
   - Defining Social Categories of Identity and Diversity
     - Diversity, Equity & Inclusion
     - Race, Ethnicity & Nationality
     - Generational Diversity
     - Sex, Gender and Sexual Orientation (e.g., LGBTQIA+ including Homophobia, Transphobia, Heteronormativity)
   - Exploring one's cultural identification by creating a capacity to be self-reflective

2. **Acknowledgement (A^2)** – Learning Objective: Through on-going self-reflection, individuals will recognize that power and privilege influence relationships on interpersonal, intergroup, and institutional levels and consider how they may have or have not been affected by those dynamics.

   Competencies:
   - To discuss how our identities impact those with whom we interact
   - To define intersectionality and explore how identities are influenced by several cultural categories
   - To explore the concept of privilege and acknowledge our individual privileges

   Module Topics shall include, at a minimum:
   - Privilege
   - Oppression
   - Intersectionality of Identity - A discussion of the impact that belonging to multiple cultural groups has on privilege and oppression

3. **Acceptance (A^3)** – Learning Objective: Through on-going self-reflection, individuals will demonstrate a continual openness to ideas, beliefs, and practices that challenge their own worldview and moves them to embrace a broader perspective.

   Competencies:
   - To identify one's personal biases and how they shape one's worldview
   - To explore the concept of microaggressions and how they can impact members of different cultural groups
   - To explore opposing views that challenge one's assumptions and beliefs (e.g., demographics, religion, politics, etc.)

   Module Topics shall, at a minimum, include:
   - Implicit and explicit bias
   - Micro-aggressions

4. **Action (A^4)** – Learning Objective: Through on-going self-reflection, individuals will be able to communicate in ways that indicate an acceptance of and appreciation for individuals different from themselves and recognize their own responsibility in leading and promoting equity and justice in a global society.

   Competencies:
   - To authentically express one's individual experiences that honors self without condemning others
   - To effectively communicate within and across cultures to foster and sustain open dialogue and navigate difficult conversations

- To develop a plan that integrates awareness, acknowledgment and acceptance into a model of action that identifies next steps for leading and promoting justice in a global society.

Module Topics shall include, at a minimum:

- Antiracism
  - Individual Level - the act of opposing racism in all forms - both in our society, other people, and even the racism that exists within yourself and in the ways you may perpetuate racism with your behaviors.
  - Organizational/Structural Level - the active process of identifying and eliminating racism by changing systems, organizational structures, policies and practices and attitudes, so that power is shared equitably.
- Allyship, Advocacy, Accompliceship
  - A discussion of the concepts of allyship, advocacy, and accompliceship as mechanisms for those with a privileged status to work in solidarity with a marginalized individual or group of people to eliminate the systemic oppression that grants them greater power and privilege.
- Courageous Conversations
  - A discussion of strategies for effectively communicating across differences by using authentic dialogue in an atmosphere of trust and respect.

Credentialing

Institutions who wish to have their micro-credential certified by CPE must develop a process for awarding credit or recognition. Credit and/or recognition must consider the following:

- A micro-credential awarded to students must be the equivalent of at least 6 credit hours. Institutions can develop two micro-credentials, which include the learning objectives from the A^4 model as follows:
  - The components of the first micro-credential would encompass the content found in the Awareness and Acknowledgement phases of the A^4 model and would provide enough content to receive credit (6 hours). The program must be accessible for all students and would be prerequisite for Acceptance and Action.
  - The components of the second micro-credential would encompass the content found in the Acceptance and Action phases and would provide enough content to receive 6 hours of credit. This additional coursework would be optional and would occur after meeting the prerequisite.

- A micro-credential awarded to faculty/staff must be a minimum of eight professional development hours and include the learning objectives from all for four phases of the A^4 models. Institutions may develop their own professional development for faculty/staff, or they may take advantage of one of the implementation methods offered by the Council.

CPE Cultural Competency Certification Process

Institutions who wish to have their cultural competency micro-credential recognized by the Council as a certified Kentucky Cultural Competency Credential must submit a proposal using the CPE Cultural Competency Credential Certification Process. Cultural competency credentials must align with the A^4 Model for Cultural Competence and describe how participants will demonstrate the competencies in the framework in order to receive approval.

Proposals must include the following:

- Institutional Information – This section will include the name of the institution, point of contact, contributing departments, proposed implementation date and a statement of support from the president.

- Body of the Proposal – The section will include a description of the following:
  - An overview of the program, a description of the target audience (e.g., faculty, staff, students, etc.)
  - A description of implementation method and the timeline (e.g., total time required to complete the certification; equivalent to at least 6 credit hours for students and eight professional development hours for faculty/staff)
  - A course outline and description of how the course aligns with the competencies in the A4 model
  - A description of the tasks required of the participant (e.g., workshops, writing assignments, learning plans, quizzes, peer review, etc.)
  - A description of assessments (what participants need to do to demonstrate competency in a particular area), and faculty/staff associated with implementation
  - A description of how the micro-credential will be awarded and ultimately displayed by the recipient

- Budget – This section will include a description of budget implications and resources needed for implementing this program.

Upon receipt, the Cultural Competency Advisory Council, consisting of faculty and staff representatives from Kentucky's two- and four-year public institutions, will review the proposal materials and provide feedback on compliance with the standards and requirements outlined herein within ten (10) working days. Proposal review shall be an interactive process and feedback may include recommendations for proposal modifications. Once the advisory council determines that a program meets the outlined requirements, staff will make a recommendation to the Academic and Strategic Initiatives Committee (ASI) that the credential be certified as a Kentucky cultural competency credential.

TITLE: 2022-24 Academic Readiness Indicators

RECOMMENDATION: Staff recommends that the Committee approve the 2022-24 Academic Indicators, and recommend final approval by the Council at its June 25, 2021 meeting.

PRESENTERS: Amanda Ellis, Associate Vice President of K-12 Policies and Programs

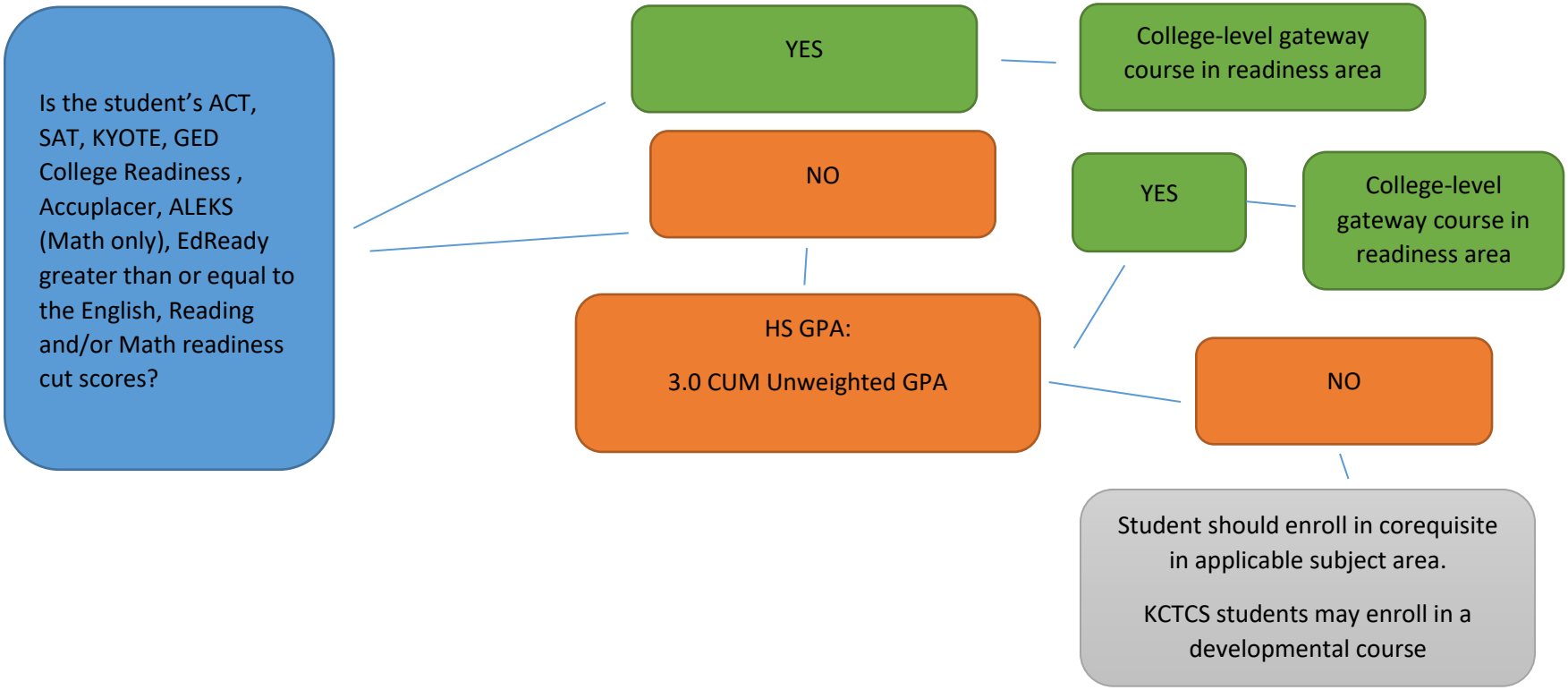
SUPPORTING INFORMATION

Per 13 KAR 2:020, CPE determines college readiness indicators. Each year CPE staff work with institutional representatives to determine which assessments should be accepted as statewide college readiness indicators and which benchmark scores should determine readiness.

CPE staff worked with campus representatives for the past several months reviewing and updating the academic readiness indicators for academic years 2022-24. The proposed indicators included the addition of ACCUPLACER, EdReady, and an unweighted, cumulative GPA of 3.0. Attachment A includes all indicators and minimum cut scores for each measure.

CPE staff will continue to analyze data, over the next three years to determine the predictability of each indicator and adjust accordingly.

PROPOSED Kentucky Academic Readiness Decision Band



Area	ACT	SAT	KYOTE	GED College Readiness	Accuplacer	ALEKS	EdReady Diagnostic
English (Writing)	18	22	6	165	250		70
Reading	20	24	20	165	250		70
Math (Quant Reasoning)	19	510	22	165	250	30	55
Math (College Algebra)	22	540	14	175	*	46	65
Math (Calculus)	27	640	15	NA	*	76	*

** Institutions may determine readiness at these levels based on institutional data, as long as students have met the quantitative reasoning benchmark in one of the identified measures.*

TITLE: Statewide Academic Program Review Policy

RECOMMENDATION: Staff recommend the Committee approve the revised Academic Program Review Policy, and recommend final approval by the Council at its June 25, 2021 meeting.

PRESENTERS: Melissa Bell, Vice President of Academic Affairs and Student Success

STATUTORY AUTHORITY

The academic program review process is a key responsibility of the Council on Postsecondary Education. The process ensures that academic programs are consistent with state and institutional strategic priorities and that public resources are used efficiently for the greater good of the Commonwealth.

Specifically, KRS 164.020 (16) outlines four criteria for statewide academic program review to determine:

- Consistency with the institution's mission;
- Alignment with the state's strategic postsecondary agenda and implementation plan.
- Elimination of unnecessary duplication of programs within and among institutions.
- Efforts to create cooperative programs with other institutions through traditional means, or by use of distance learning technology and electronic resources, to achieve effective and efficient program delivery.

BACKGROUND INFORMATION

Over the past two years, all universities reviewed all baccalaureate programs using a methodology developed by Gray Associates, which produced a new baseline academic portfolio in the state. The proposed process going forward combines the analytical tools developed in the past two years with existing institutional processes to continue the focus on institutional mission alignment, unnecessary duplication, and efficiency and

integrates a greater emphasis on alignment with the statewide postsecondary strategic agenda.

NEXT STEPS

Following review and approval by the Committee, the Council will be asked to provide final approval at its June 25, 2021 meeting and the policy would become effective on July 1, 2021.

Statewide Academic Program Review Policy

Approved by the Council: June 25, 2021 (proposed)
Effective Date: July 1, 2021

Statewide Academic Program Review: Policy and Framework

The statewide academic program review process is a key responsibility of state coordinating boards like the Council on Postsecondary Education (CPE). The process ensures that academic programs are consistent with state priorities and that public resources are used efficiently for the greater good of the Commonwealth.

History of Kentucky Statewide Academic Program Review

The Postsecondary Education Improvement Act of 1997 created CPE and outlined the criteria for program review in statute.

More specifically, KRS 164.020 (16) outlines four criteria for statewide academic program review to determine:

- Consistency with the institution's mission;
- Alignment with the state's strategic postsecondary agenda and implementation plan.
- Elimination of unnecessary duplication of programs within and among institutions.
- Efforts to create cooperative programs with other institutions through traditional means, or by use of distance learning technology and electronic resources, to achieve effective and efficient program delivery.

Statewide program review has taken several forms since the inception of CPE but each process has focused on continuous improvement as well as the operationalization of statutory criteria.

In November 1999, CPE passed a series of guidelines related to academic programs that streamlined the process of reviewing programs and recognized the need for institutional flexibility within the new postsecondary structures of the Kentucky Postsecondary Education Improvement Act of 1997. The Council's Guidelines for Review of Academic Program Productivity established degree production thresholds to identify programs for review. The Council conducted four rounds of program productivity review under these streamlined policies. At its January 30, 2006, meeting, the Council amended its Guidelines for Review of Academic Program Productivity to specify a four-year review cycle, and several more rounds of statewide review were conducted.

The statewide program review policy was revised again in 2011, with an implementation date of the 2013-14 academic year. The policy revisions were made in light of best practices, better coordination among state and institutional practices, and an improved connection between academic program approval and review of existing academic programs. CPE conducted five rounds of program reviews under this iteration of the policy.

After several iterations of policy development and numerous rounds of program review, CPE decided to do a one-time comprehensive analysis of academic programs in the state. In 2019, CPE contracted with Gray Associates to work with universities to review all baccalaureate programs. Gray Associates assisted Council staff to create a methodology that provides campuses with consistent, detailed information to help guide decisions about program needs and improvement. The marginal financial contribution and more than 50 metrics related to student demand, employment, and competition were calculated for each program. Campus representatives participated in facilitated workshops to review these data and analyze each baccalaureate program. CPE also used this data analysis to operationalize unnecessary duplication and identify programs that met the criteria.

Academic Program Review Process

The program review policy incorporates elements of the comprehensive data analysis with a greater focus on program alignment with the statewide strategic agenda.

The process consists of three major components:

- Annual reports summarizing institutional review efforts;
- Statewide data analysis focused on efficiency criteria; and
- Efforts to scale up implementation of the statewide postsecondary education strategic agenda.

Institutional Annual Reports

Institutions will be required to submit an annual report by July 15th that:

- Summarizes the institutional program review process for the previous academic year, with a special emphasis on the data analyses conducted as well as summaries of meetings of university faculty, committee, or administration where data and processes were discussed;
- Highlights the programmatic decisions made during the previous academic year, with an accompanying rationale for the decision that summarizes all data sources and any supplementary information used to arrive at the stated conclusion; and
- Discusses the plans for institutional program review for the upcoming year.

CPE staff will evaluate these reports and work with institutions if any information is missing or any questions arise. Staff will provide a summary report to the Academic and Strategic Initiatives Committee as well as the full Council.

Statewide Data Analysis

CPE staff will analyze data across institutions each spring semester to determine which programs continue to meet the following criteria for unnecessary duplication:

- Multiple programs in the same CIP code;
- Low and declining enrollment;
- Low new student demand;
- Low market demand; and

- Low or negative contribution margins.

Using this operationalized definition of unnecessary duplication, CPE staff will identify potential collaborative opportunities and work with institutions to identify other potential efficiencies. Staff will provide a summary report to the Academic and Strategic Initiatives Committee and the full Council.

Statewide Strategic Agenda

The strategic agenda highlights priority areas to focus statewide discussions and strategies to accomplish our postsecondary goals. To facilitate implementation of the strategic agenda, each year CPE staff will focus on one or more of the priorities to:

- Understand existing policies and practices at institutions related to the priority;
- Identify obstacles to full implementation of initiatives related to the priority;
- Provide professional development opportunities related to the priority; and
- Evaluate campus plans to create, implement, or expand initiatives related to the priority.

Staff will provide regular updates on this process to the Academic and Strategic Initiatives Committee. In addition, staff will provide an annual report highlighting all these efforts to the full Council.

Summary

Statewide academic program review efforts will continue to monitor the efficiency of the statewide academic program portfolio while expanding the focus on the implementation of high-priority initiatives identified by the statewide postsecondary education agenda.

CPE staff will continue to update the Academic and Strategic Initiatives Committee and submit an annual report to the committee with information about the three major elements of the statewide program review process – institutional annual reports, statewide data analysis and implementation of initiatives related to the statewide agenda.

TITLE: Proposed New Academic Programs for Review & Recommendation

RECOMMENDATION: Staff recommends the Committee accept the proposed New Academic Programs from Northern Kentucky University, the University of Kentucky and the University of Louisville, and recommend approval of each to the full Council at its June 25, 2021 meeting.

PRESENTER: Melissa Bell, Ph.D., CPE's Vice President of Academic Affairs and Student Success

SUPPORTING INFORMATION

KRS 164.020 (15) empowers the Council on Postsecondary Education to define and approve the offering of all postsecondary education technical, associate, baccalaureate, graduate, and professional degree, certificate, or diploma programs in the public postsecondary education institutions.

Council staff has reviewed the proposed programs and recommends approval by the board. The university-submitted documentation has been included in your agenda packets for review.

PROGRAMS PROPOSED FOR APPROVAL

Northern Kentucky University

- Health Administration (M.S.), CIP Code 51.0701

University of Kentucky

- Aerospace Engineering (M.S.), CIP Code 14.0201
- Aerospace Engineering (PhD), CIP Code 14.0201
- Biostatistics (M.S.), CIP Code 26.1102
- Computer Engineering Technology (B.S.), CIP Code 15.1201
- Lean Systems Engineering Technology (B.S.), CIP Code 15.9999

University of Louisville

- Computer Science (B.A.), CIP Code 11.0701
- Doctor of Social Work, CIP Code 44.0701

PROPOSED PROGRAM SUMMARY

Instituion: Northern Kentucky University
Program Name: Health Administration
Degree Designation: MASTER OF SCIENCE (MS)
Degree Level : Master's

Program Description

The School of Allied Health proposes a 33 credit hour Masters of Science in Health Administration (MSHA) to replace our current Masters of Science in Health Sciences (MSHS). The proposed program would be targeting early and mid-careerists in medical and health services management. Our proposed MSHA features an integrated curriculum based on core competencies that drive success in the contemporary health care industry and aligns with accreditation standards for the Commission on Accreditation of Healthcare Management Education (CAHME).

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify

YES

The Masters of Science in Health Administration (MSHA) will replace our current Masters of Science in Health Sciences (MSHS).

CIP Code: 51.0701
Credit Hours: 33
Institutional Board Approval Date: 9/15/2020
Implementation Date: 1/15/2021

Student Demand

Year 1 - 30
Year 2 - 80
Year 3 - 110
Year 4 - 150
Year 5 - 150

Market Demand

The proposed program would be targeting early and mid-careerists in medical and health services management. Our proposed MSHA features an integrated curriculum based on core competencies that drive success in the contemporary health care industry and aligns with accreditation standards for the Commission on Accreditation of Healthcare Management Education (CAHME).

The MSHA provides students with skills for employment in a variety of health services settings including hospitals, pharmaceutical companies, community health

organizations, multispecialty services, insurance companies, biomedical research organizations, long-term care facilities, and emergency preparedness organizations in both the public and private domains. The median annual salary for medical and health managers is about $100, 000 nationally and the US Bureau of Labor Statistics projects a job growth of 18% between 2018 to 2028. The level of employment in Kentucky is 5,000 with a median salary of $83, 550 and a range of $53,360 to $135,000. In the state of Ohio, the average salary is $101,390 with an employment level of $14,760.

Our proposed program is very competitive in terms of affordability, ease of access, completion time, and job prospects for graduates. The proposed program would also be the only completely online graduate health administration program in the state of Kentucky and would be the program with the lowest credit requirements in Kentucky and the greater Cincinnati region. Almost all the other comparable programs require GRE or GMAT for admission.

We project annual enrollments of 30 to 50 students. At the end of five years, we expect a student population of 90 to 150 students at any given time. These enrollment numbers could be significantly higher since we are collaborating with Academic Partners who bring significant marketing capacity to the table.

Employment Demand

	Regional	State	National
Type Of Job	**Medical and Health Services Managers**		
Avg. Wage	$101,390	$91,820	$113,730
# Jobs (Postings)	14760	5000	406100
Expected Growth	18%	18%	18%

Indicate source of market demand information
SOURCE: US DEPT. OF LABOR, BLS. (2018)
https://www.bls.gov/ooh/management/medical-and-health-services-managers.htm

18% (Much faster than average)

2018-2028

Academic Demand
Not Applicable. This is a Professional Degree

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
3199	00198900	University of Kentucky	MHA	Health Administration	2015
3267	00198900	University of Kentucky	MHA		2015
5058	00200200	Western Kentucky University	MHA	Health Administration	2015

Comparison of Objectives/Focus/Curriculum to Similar Programs:
This is a summary of characteristics for similar programs in Kentucky and the Greater Cincinnati region.

1. Western Kentucky University: Hybrid, 42 credits
2. UK: F2F, 42 credits
3. UOL: 57 credits
4. UC: Online, 40 credits
5. Xavier: 64 credits.

Our program distinguishes itself from other national, regional and state programs in terms of affordability, ease of access, completion time, and job prospects for our non-traditional students.

An analysis of Health Administration programs in the US by Academic Partners reveals that the most competitive Health Administration programs have a 30 to 36 credit hour requirement. We propose a 33-credit hour program, which makes it very competitive. Program credits nationwide range from 30 credits to slightly above 60 credits.

Western Kentucky University has a 42 credit Hybrid program which is offered both online and face to face. GRE or GMAT Exam scores are required.

The UK program is a 42 credit face to face traditional program. It requires a GPA of 3.00 or above GRE or GMAT scores.

The Xavier University Program is a 64 credit traditional face to face program. It requires GMAT or GRE and a full third year Residency requirement.

Comparison of Student Populations:
Most of our students are non-traditional students who are challenged by commuting cost, work schedules, and family obligations. Our program is open to early to mid career focus program which is between traditional early careerist and Executives. Most of our students are non-traditional students who are challenged by commuting cost, work schedules, and family obligations. One hundred percent online offering provides flexibility of attendance and eliminates other barriers.

Western Kentucky University has both traditional and Executive Programs. Most of their students are traditional and residential. GRE is required. Geographically our service areas hardly intersect.

The student population in the UK program is more traditional than ours. Many see the MHA as a path to the PhD program.

Xavier's student population is mostly urban and traditional students.

We have a mixture of urban and rural population. Most of our students are non-traditional students who are challenged by commuting cost, work schedules, and family obligations.

Access to Existing Programs:
Our program is 100% online and we almost have open enrollment admission requirements. We do not require standardized test such as GRE or GMAT and students can be admitted with a GPA of 2.5. Besides, the competitive number of credits required to complete the program makes our proposed program more affordable for both in state and out-of-state applicants.

Besides the advantage of online delivery that our proposed programs offers, unlike our program, existing programs tend to have a GMAT or GRE requirement for admissions which provides an additional access barrier. Similar programs also require more credits for completion which increases both the time of completion as well as cost of completion.

Feedback from Other Institutions:
In 2017, we had both face -to -face and telephone conversations with faculty colleagues at the University of Kentucky Masters in Health Administration Program. They offered to share their experience in administering accredited health administration programs with us and to support our program in any way possible once it is approved.

Cost

Projected Revenue over Next Five Years ($) : 4404833
Projected Expenses over Next Five Years ($) : 2358551

Will Additional faculty be needed? Yes

Yes, after two years of operation but not initially.
We will use existing MSHS faculty lines in the first two years in conjunction with four to five adjunct practitioner faculty. Two of our existing faculty lines could be converted into one twelve month program Director position and one nine month faculty position. After two years of operation and before applying for accreditation, we will need a minimum of one additional faculty.

Provide a budgetary rationale for creating this new program

The MSHA program is an outgrowth of the current MSHS program and replaces the MSHS program. It is a more efficient and effective use of university resources because it provides superior employment opportunities for the students at about the same cost and completion time. The program responds to transformations in the health care industry and employment readiness challenges facing MSHS students. The health sciences faculty decision to pursue a Master's of Science in Health Administration was guided by the high preference for the health administration track among our MSHS students. Yet, the MSHS program does not provide a wide enough health administration course footprint to meet the required competencies for medical and health services managers.

Course Title (CIP)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
HCA	510	Health Care Systems and Environments	This foundation course identifies and explains the essential elements of current health care systems with primary focus given to emerging relationships among all the diverse components. The scope of study will include acute care populations as well as extended life-care facilities and specialized care for the physically and mentally challenged. Course emphasis will be on the role of the health manager in meeting the complex challenges resulting from the rapid changes in the delivery of health care. Ethical, legal, policy, and regulatory aspects of the health care environment will also be explored.	C	3	E
HCA	630	Strategic Planning and Marketing for Health Services	This course explores the general philosophy and activities of marketing and strategic management in health services organizations. Topics include: assessing and understanding the needs of key customer groups; health consumer behavior; market segmentation and targeting; staff needs and relations; forecasting service demand; new product development; product pricing and distribution; advertising and public relations; analysis of collaborative and competitive environments, and strategy formulation.	C	3	E
HCA	640	Health Law, Policy, and Ethical Issues	This course provides an overview of the diverse and complex policy, ethical, and legal issues relevant to health care management. The course primarily explores the legal and ethical frameworks that determine the components, and process of health policymaking, as well as the options and constrains of health policies in the United States. Ethical perspectives are threaded through all learning activities with the view of preparing students to develop appropriate policy development skills and to apply an understanding of legal and ethical issues to management in the health care environment.	C	3	E
HCA	650	Health Care Economics	This course focuses on the application of the discipline of economics to the unique situation of the health care environment. No prior knowledge of Economics is assumed. The study of economic concepts and the implications of market situations and competitive systems for health and health care decision making at the individual, firm, and societal level will be discussed. The tools of economics will be applied to both managerial issues such as pricing decisions and policy issues such as the medically uninsured. Topics covered also include the problems posed by the current roles of federal, state, and local governments on the demand and cost of health care delivery.	C	3	E
MHI	601	Technical Foundations of Health Informatics	This core course provides an introduction to concepts and trends in the Health Informatics field both locally and nationally. The course provides an overview of networks, software, and computers in healthcare with a particular focus on their use in interoperable systems. Applications include electronic health records, computerized physician order entry, and digital imaging.	C	3	E
HCA	601	Finance and Budgeting in Healthcare	This course provides an overview of the major financial management issues relevant to diverse health services delivery settings. Principles and application of practical and essential financial management strategies and techniques form the foundation of the course. Emphasis is on management, control, and interpretation of financial statements. Health management case studies focusing on budgeting, cash flow management, and financial statements are included.	C	3	N
HCA	652	Org. Behavior and Strategic Human Resource Mgt.	This course provides for the application of concepts of organizational behavior and strategic human resource management in health care systems. Emphasis is given to human behavior at the individual, group and organizational level and the integration of strategic management in human resources. The student will develop vision, problem solving and analytical skills for operational and strategic leadership.	C	3	N
HCA	602	Managerial Epidemiology	This course focuses on effective management of resources to maintain and promote the health of populations. The course provides an overview of the complex economic, environmental, social, and behavioral causes affecting the health of populations. Emphasis will be on the use of population health data to assess community health, determine community risk factors, evaluate community-based programs, and plan medical care operations.	C	3	N
HCA	600	Research Methods and Data Analysis for Health Care Managers	Focusing on both quantitative and qualitative research data, this course engages the students in the development of an original research study concerning an aspect of the practice of health care management, administration, policy, or leadership. This course provides the students the opportunity to consider scholarly research methods not only in the abstract, but also in terms of successfully applying this knowledge through engaging in the preparing of a proposal for an evidence-based health care management project. The students should use the knowledge they gain in this course to complete their capstone experience project.	C	3	N
HCA	653	Health Care Quality and Project Management	Critically examines the concepts, strategies and techniques related to the improvement of the quality of health services delivery and risk management. This includes control of quality and costs through market-oriented strategies, professional self-regulation, intra-organizational process improvement approaches, third-party strategies, and government regulation, and system reform. The principles and techniques to plan and manage complex projects are emphasized.	C	3	N
HCA	691	Health Care Capstone a. Health Care Management Internship and Report OR b. Professional Portfolio	a.Healthcare Management Internship and Report Credit Hours: 3 (Revised) This requires the equivalent of 3 credit hours of on-site experience under the supervision of a qualified preceptor and program faculty. At the end of the experience, there will be a written evaluation by the supervisor and submission of an integrative management paper by the student followed by a formal presentation of the student's work. OR b.Professional Portfolio Credit Hours: 3 This option is only open to students with five or more years of healthcare management experience. A Professional Portfolio option for the Capstone experience is a document that demonstrates the acquisition of knowledge, skills, and attainment of professional goals that are demonstrated through the internship and report option. The student systematically assesses and evaluates their own professional development. The second segment of the Professional Portfolio option is the completion of a major systematic literature review paper followed by a formal presentation.	C	3	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core)	**Note: number recorded**	**33**	**NA**

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable)				**Note: number recorded will**	**0**	**NA**

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table			NA

FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)			Note: number		0	NA

Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)	33	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	0	NA
	Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	0	NA
	Free Elective Hours (i.e., general program electives) (if applicable)	0	NA
	Total # of credit hours required for Program	33	NA
Information to be completed by PIE Office			
	# of new courses		NA
	Total # of Courses (includes new and existing)		NA
	Precentage of new courses (more than 25% may require SACS Substantive Change)	#VALUE!	NA

Northern Kentucky University
MS - MASTER OF SCIENCE
51.0701-Health/Health Care Administration/Management.
Submission Date: 03/11/2021 10:28

Full Proposal - Basic Info

Institution :	Northern Kentucky University
Program Type :	Single Institution
Program Name :	Health Administration
Degree Level :	Master's
Degree Designation :	MASTER OF SCIENCE
CIP Code (2-Digit) :	51-HEALTH PROFESSIONS AND RELATED PROGRAMS.
CIP Code :	51.0701-Health/Health Care Administration/Management.
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	5/1/2021 12:00:00 AM
Intended Date of Implementation :	5/1/2021
Date of Governing Board Approval :	3/10/2021

Institutional Contact Information

First Name : David
Last Name : Tataw
Title : Program Director
Email : tatawd1@nku.edu
Phone : 859-572-5557

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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The School of Allied Health proposes a 34-Credit Master of Science in Health Administration (MSHA) to replace our current Master of Science in Health Sciences (MSHS). We plan to begin implementation in Summer Semester of 2021. While staying consistent with student success and workforce expansion goals of both NKU and the state of Kentucky, the proposed program will be targeting early and mid-careerists in medical and health services management. Our proposed MSHA features an integrated curriculum based on core competencies that drive success in the contemporary health care industry and align with accreditation standards for the Commission on Accreditation of Healthcare Management Education (CAHME). The MSHA provides students with skills for employment in a variety of health services settings including hospitals, pharmaceutical companies, community health organizations, multispecialty services, insurance companies, biomedical research organizations, long-term care facilities, and emergency preparedness organizations in both the public and private domains.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

The MSHA program supports the mission and strategic priorities of both Northern Kentucky University (NKU) and State of Kentucky's commission on postsecondary education (CPE) strategic agenda. The program objectives are aligned with the mission and strategic direction of Northern Kentucky University by focusing on student success and regional healthcare workforce expansion. The program will expand access to health administration education, offer shorter degree completion time compared to existing programs, and increase the number of skilled medical and health services managers in our regional workforce. NKU's Success by Design Framework focuses on student success by advancing access, completion, as well as career and community engagement.

The program objectives are also aligned to the top priorities of statewide postsecondary education strategic agenda. Consistent with CPE educational agenda priorities, the program seeks to ease entrance into postsecondary education, provide a shorter completion time compared to similar degrees, and strengthen the state and regional economic performance through increases in the number of skilled healthcare workers. The top priorities of the state's educational agenda include encouraging more people to take advantage of postsecondary opportunities, increasing degree and certificate completion, filling workforce shortages, guiding more graduates to a career path, and creating economic growth and development to make Kentucky more prosperous.

4. Is there a specialized accrediting agency related to this program?

Yes

4a. If yes, identify accreditor:

Commission on Accreditation of Healthcare Manageme

4b. Will accreditation be sought?

Yes

5. Does this program have a clinical component?

No

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5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

7. Describe the rationale and need for the program to include how the institution determined need.

The proposed program curriculum conforms to the health sciences opportunity plan developed by health science faculty in the former Department of Allied Health in November 2016 and responds to transformations in the healthcare industry and CAHME accreditation standards. The health sciences faculty decision to pursue a degree in Health Administration was guided by the high preference for the health administration and leadership track among students in our Master of Science in Health Sciences (MSHS). More than 75 % of MSHS students elect to focus on the health administration and leadership track. Yet, the MSHS program does not offer enough health administration courses for graduates to be competitive in the medical and health services managers' job market. The MSHA offers adequate preparation to our students for this expanding and rewarding career opportunity. Based on enrollment trends in our MSHS program, we project annual enrollments of 30 to 50 students. At the end of five years, we expect a student population of 90 to 150 students at any given time. These enrollment numbers could be significantly higher since we are collaborating with Academic Partners who bring significant marketing capacity to the table.

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Full Proposal - Quality: Program Quality and Student Success

Provide specific programming goals (objectives) and specific learning outcomes for the program.

The proposed programs has the following objectives to advance specific institutional and societal needs that this program will address:

To train early and mid-careerists for success in a variety of medical and health services settings including hospitals, pharmaceutical companies, community health organizations, multispecialty services, insurance companies, biomedical research organizations, long-term care facilities, and emergency preparedness organizations in both the public and private domains.

To offer an integrated curriculum based on core competencies that drive success in the contemporary healthcare industry and aligns with accreditation standards for the Commission on the Accreditation of Healthcare Management Education (CAHME).

To provide a competitive program in terms of affordability, ease of access, completion time, and job prospects for residents of Northern Kentucky, the Commonwealth of Kentucky, and beyond.

Framework for Learning Outcomes Our proposed program adopts 10 of the 26 competencies of the National Center for Healthcare Leadership (NCHL) Competency Model as the framework for learning, assessment, and program outcomes. The ten competencies adopted consist of analytical thinking, financial skills, strategic orientation, collaboration, communication, performance measurement, project management, professionalism, team leadership and self-development. These ten competencies align with trends in the industry and key success factors for early and mid-careerists that our program intends to develop and/or strengthen. The identified competencies fall into the three domains of transformation, execution, and people as follows: • Transformation o Analytical thinking o Financial skills o Strategic orientation • Execution o Collaboration o Communication skills o Performance measurement o Project management • People o Professionalism o Team leadership o Self-development Student Learning Objectives Upon completion of the Master of Science in Health Administration program, each student will demonstrate proficiency in the following domains of the National Center for Healthcare Leadership (NCHL) competency model: i. Transformation domain of the NCHL Competency Model including analytical thinking, financial skills, and strategic orientation. ii. Execution domain of the NCHL Competency Model including collaboration, communication skills, performance measurement, and project management. iii. People domain of the NCHL Competency Model including professionalism, team leadership, and self-development.

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Describe how the student learning outcomes for the program will be assessed.

Individual outcomes of the program will be measured developmentally throughout the program of study as presented in the curriculum outcomes mapping table below. Outcomes will be measured as outlined in course specific student learning objectives and expectations; and as applied, observed, and comprehensively assessed in the internship and capstone seminar experience. Quizzes, tests and examinations, papers, oral presentations, case studies, creative projects, and portfolios are some of the methods that will be utilized.

The cumulative assessment for the MSHA is in the capstone experience. The capstone project will be assessed according to specified guidelines and expectations. The capstone course provides for the culmination and presentation of the management project initiated in the internship. Completion of the internship project, written paper, and presentation is assessed by the program faculty and a field supervisor.

We also present the proposed program's outcomes/assessment matrix below, which provides direct indicators of achievement of program-level student learning outcomes. Each competency domain and related skills are linked to one or more assessment tools and/or strategies in the outcomes/assessment matrix presented below and to one or more courses on the curriculum map presented in outcomes mapping above. There will be an annual formative evaluation including assessment of selected limited student learning objectives and collection of program data relevant to regional and specialized accreditation and 5 year institutional review. The overall program will be comprehensively assessed every five years using the standards set forth by the university, accrediting agencies, and the state of Kentucky.

Results of annual assessments will be used for continuous improvement of the program. Each year, the most significant or most salient outcomes assessment results based on prioritized program objectives, are used to draft and implement limited program improvements in the year following the assessment year. Program related findings gained over the five-year period are gathered on an on-going basis from course evaluations, focus groups, informal input, exit interviews, alumni surveys, employer, and the advisory board. Additional assessment tools that will be utilized are quizzes, tests and examinations, papers, oral presentations, case studies, creative projects, and portfolios.

Highlight any distinctive qualities of this proposed program.

The program differs from existing programs in many respects including target population, curriculum, focus, objectives. The program would be very competitive in terms of affordability, ease of access, completion time, and job prospects for graduates. The proposed program would also be the only completely online graduate health administration program in the state of Kentucky for early and mid-careerists and would be the program with the lowest credit requirements in Kentucky and the greater Cincinnati region. An analysis of Health Administration programs in the US by Academic Partners reveals that the most competitive Health Administration programs have a 30 to 36 credit hour requirement. We propose a 34-credit hour program, which makes it very competitive. Program credits nationwide range from 30 credits to slightly above 60 credits. In addition, all the other comparable programs require GRE or GMAT for admission.Should not be blank)

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Describe the admissions and graduation requirements for the program.

Describe admissions and graduation requirements for the program.

Admission and Application Standards

Students are admitted to the MSHA program in the fall, spring, and summer semesters and have the option of enrolling as a part-time or full-time student. Courses are offered periodically throughout the year in 7-week sessions.

To be considered for admission, a completed application and all required accompanying materials must be received no later than the semester prior to the student's start date. Applications will be objectively evaluated and ranked.

A selective admission procedure will be followed to ensure that students have the best possibility for academic success. The program director will review applications to determine whether the applicants possess the prerequisites necessary for success in the program. Admission criteria include the following:

Application for admission and application fee.
Bachelor's degree; final official transcript from each regionally accredited institution must be sent to the Office of Graduate Education.
Minimum 2.50 cumulative undergraduate GPA. Candidates with undergraduate GPAs below 2.5 could be considered for provisional Admissions after a holistic review of their applications.
Professional resume.
Undergraduate course in statistical methods with a grade C or higher is required (equivalent to STA 205 or STA 205R at NKU). This is a prerequisite for our Research Methods and Data Analysis Class.
International Applicants, who received instruction in a language other than English, must demonstrate English proficiency by earning an acceptable score on the TOEFL or IELTS exam.
Applicants with transcripts or undergraduate degrees from international institutions must provide an official copy of a third party course-by-course evaluation.

Student Advising

Upon admission to the program, students will be assigned to an academic advisor. Students are expected to maintain close contact with their advisor throughout the program. Program planning with an advisor is critical to successful completion of the program in the student's desired time frame. Students who "stop out" for any reason may have to wait a session or more to complete all program requirements depending on course offerings. According to university policy, students have up to six years to complete a master's degree program.

It is strongly suggested, though not required, that graduate students schedule a meeting with their academic advisor at the start of their program. Students are also encouraged to schedule an appointment any time they anticipate changes to their academic plan or have questions and concerns. Students are assigned to an academic advisor by their last name. Current and prospective students may utilize acuity to schedule an appointment. Links for scheduling may be found here: https://nku.edu/academics/chhs/advising.html

Degree Completion Requirements

All students applying to this program must complete all 34-credit requirements. All classes are offered in the online format to accommodate a variety of work and personal schedules. For more information on distance education, visit nkuonline.nku.edu.

Only courses taken for graduate credit and placed on a graduate transcript as graduate credit may be counted toward a master's degree GPA. No student may earn a graduate degree or graduate certificate with a GPA below 3.0 (no rounding allowed) for all graduate work taken for completion of a specific graduate program as well as a cumulative 3.0 (no rounding allowed) for all graduate work taken at the institution. If a student has declared academic bankruptcy, the graduate GPA will be based on all coursework taken subsequent to the bankruptcy. Further, no student will be awarded a degree if an I (incomplete) has not been cleared for all coursework applicable to that degree. Students must be enrolled for at least one credit hour during the semester that they wish to graduate

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Please provide the total number of hours required for the degree.

(Should not be blank)

Describe the administrative oversight to ensure the quality of the program.

Describe administrative oversight to ensure the quality of the program.

The MSHA Program Director will provide day to day administrative oversight of the Program. School and College oversight will be provided by the Director of the School of Allied Health and the Dean of the College of Health and Human Services. Program quality is further assured through oversight and collaboration with the university Associate Director of online services, the Assistant Vice Provost for Assessment, the Office of Graduate Education, and the Director of Online Education in the College of Health and Human Services.

For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

The indicators of student learning and success in our proposed program, are achievements of industry-based competencies which are used to guage professional readiness. Professional readiness and success indicators do not vary with the character of delivery timeframes. Our proposed program adopts 10 of the 26 competencies of the National Center for Healthcare Leadership (NCHL) Competency Model as the framework for learning, assessment, and program outcomes. Individual outcomes of the program will be measured developmentally throughout the program of study. Each competency domain and related skills are linked to one or more assessment tools and/or strategies in the outcomes/assessment matrix and to one or more courses on the curriculum map presented in outcomes mapping above.

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	34	34	0	0

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

Based on enrollment trends in our MSHS program, which will be replaced by the MSHA program, we project annual enrollments of 30 to 50 students. At the end of five years, we expect a student population of 90 to 150 students at any given time. As noted earlier, these enrollment numbers could be significantly higher since we are collaborating with Academic Partners who bring significant marketing capacity to the table. Academic Partners have committed to aggressively market the program to our current undergraduate students, alumni, and early and mid-careerists in the greater Cincinnati healthcare industry. Academic Partners have been able to help some other NKU online programs such as our nursing programs to increase enrollment by more than four hundred percent in the past two years.

Applicant Pool: The applicant pool is made up of about 3,000 students graduating from NKU undergraduate programs including arts and science, business, and health science programs. Additional applicants will be drawn from graduates of undergraduate programs in other greater Cincinnati universities and colleges; early and mid-careerist in the greater Cincinnati healthcare industry; and students from other states who want to take advantage of the flexibility and ease of access our program offers. Applicants will be reached by radio, television, and social media campaigns, internal NKU marketing, and through direct employer communications using electronic and print media.

Student recruitment and selection process.

Students will be recruited via radio, television, and social media, internal NKU marketing, and through direct employer communications. Marketing tactics include but are not limited to the following: electronic and traditional content sharing with applicant pool, web dedicated landing page, field flyers for campus community, employers and professional meetings, search engine optimization, electronic and print media articles, student/graduate testimonials, and faculty profiles.

Students will generally apply through the university website. To be considered for admission, a completed application and all required accompanying materials must be received no later than the semester prior to the student’s start date. Applications will be objectively evaluated and ranked. A selective admission procedure will be followed to ensure that students have the best possibility for academic success. The program director and admission coordinators will review applications to determine whether the applicants possess the prerequisites necessary for success in the program.

Primary feeders for the program.

Primary feeders to the program will come from about 3,000 graduates of NKU undergraduate programs in health and human services, arts and science, business and informatics. This includes recent graduates working in the greater Cincinnati region.

Projected net increase in total student enrollments to the campus as a result of the proposed program.

We are collaborating with Academic Partners in offering this program, and Academic Partners have committed to aggressively market the program to our current undergraduate students, alumni, and early and mid-careerists in the greater Cincinnati healthcare industry. Academic Partners have been able to help some other NKU online programs such as our nursing programs to increase enrollment by more than four hundred percent in the past two years.

Estimated student enrollment in the first five years of the program.

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1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	30
2022-23	25	65
2023-24	60	86
2024-25	80	95
2025-26	90	95

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Medical and Health Services Managers	101390	14760	18.0	91820	5000	18.0	113730	406100	18.0

2b. Clearly describe evidence of employer demand.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

Not Applicable

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

4a - Please identify any distinguishing characteristics of this new program.

4b - How will the program support or be supported by other programs within the institution?

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
University of Kentucky	*Health Administration	51		48	19	44	21	44	15	44	20	57	29
Western Kentucky University	*Health Administration	31		43	19	52	19	54	31	70	24	69	30

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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Internal					
Allocation :	0	0	0	0	0
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Student Tuition					
New :	354240	472320	590400	590400	590400
Existing :	0	318136	425088	531360	531360
Narrative Explanation/Justification :	We project annual progressive enrollments of 30, 67, 86, 95, and 95 students from year one to five @ $312 per credit hour. Average student course load is projected at twelve (12) 3-credit courses with a maximum of 33 credit hours per student a year. NKU retains 50% of tuition proceeds per agreement with Academic Partners. In addition, each student is assessed a campus recreation fee of $16.00.				
Total					
New :	$354,240	$472,320	$590,400	$590,400	$590,400
Existing :	$0	$318,136	$425,088	$531,360	$531,360
Total Funding Sources :	$354,240	$790,456	$1,015,488	$1,121,760	$1,121,760

B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	0	0	0	0	0
Existing :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Other Professional					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Faculty					
New :	304080	63612	177883	67092	68366
Existing :	0	247860	252817	372484	379934
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Faculty resources include two existing faculty lines, one additional faculty beginning third year of program, and 4-5 adjunct faculty teaching 24 classes each per year @$2,500.00 per class. We assume annual cost growth of 2% in Cost of Living Adjustment (COLA) increases.				
Equipment and Instructional Materials					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Other Support Services					
New :	27433	0	0	0	0
Existing :	0	27982	28541	29112	29694

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Narrative Explanation/Justification :	This cost represents support services @ .5 FTE and assuming growth of 2% annual Cost of Living Adjustment (COLA) increase				
Faculty Development					
New :	8000	8000	8000	8000	8000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	This cost covers Faculty travel to conferences and professional development. Cost for conferences in the first two years is same as the cost in the last three years even though there will be two faculty in the first two years and three faculty in year three to five. This is because in the first two years, accreditation prep training is included in the cost of faculty travel and development.				
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	N/A				
Other					
New :	1700	0	0	0	0
Existing :	0	1700	6700	6700	6700
Narrative Explanation/Justification :	This additional cost includes projected accreditation dues of $5,000 beginning the third year plus printing, postage, supplies, and miscellaneous cost estimated at $1,700 annually for each of the five years.				
Total					
New :	$341,213	$71,612	$185,883	$75,092	$76,366
Existing :	$0	$277,542	$288,058	$408,296	$416,328
Total Budget Expenses/Requirements :	$341,213	$349,154	$473,941	$483,388	$492,694
Grand Total					
Total Net Cost :	$13,027	$441,302	$541,547	$638,372	$629,066

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Full-Proposal - Assess: Program Review and Assessment

1. Provide a brief description of institutional assessment processes.

The Institutional assessment process is led by the Assistant Vice Provost for Assessment. A standard assessment process is established and implemented with the support of the University Assessment Committee, which is populated by faculty members from a broad range of colleges, departments, and academic offices. The purpose of the committee is to promote and support a culture of assessment and continuous improvement as well as serve as a resource for assessment practices on campus. In order to expand the culture of assessment, NKU offers departments and programs the flexibility to define and pilot their own assessment cycles. The AVP of Assessment and the Assessment Committee does not prescribe or specify a timeframe or deadlines, seeking instead to accommodate the different nature and varying needs of each program. Programs have also been given the flexibility to decide how many Student Learning Outcomes (SLOs) to assess in a given year. While some programs follow an annual assessment cycle during which all SLOs are assessed every year, other programs chose to follow a multiyear assessment cycle in which one or two SLOs are assessed per year. Program SLOs are located in WEAVE, where they are updated by each program at least annually.

However, NKU's Assessment Guidebook provides a simple annual schedule that goes from October to September. Assessment plans are due no later than October 15th, and assessment reports are due no later than September 15th of the following academic year. The assessment process begins at the start of the fall semester (August) with an email to all departments from the AVP of Assessment. The email offers an overview of the assessment cycle and significant deadlines as well as instructions for updating information in WEAVE. Email reminders and offers of assistance follow, and the AVP offers workshops and individualized help for all programs and departments. The WEAVE application shows that an assessment plan has been updated with a green "completed" indicator, and the AVP can run a report to identify programs that may need extra support.

2. Describe how the institution will incorporate the change (program, site, distance education, or other change) into the institution-wide review and assessment processes.

Program assessments are part of the institutional-wide annual assessments that are entered into weave and centrally tracked by the Assistant Vice Provost for Assessment. Each year, the most significant or most salient outcomes assessment results based on prioritized program objectives, are used to draft and implement limited program improvements via assessment action plans in the year following the assessment year. Program faculty and advisory boards prioritize short term and long-term program objectives to be assessed and formulate action plans for program improvement. Program related findings gained over a five-year review period are gathered on an on-going basis for summative decision-making. Both the timeline for review, and program objectives to be reviewed, and action plans, are aligned with institutional, state, or national accreditation requirements.

3. What are the plans to evaluate students' post-graduate success?

Student post-graduate success will be measured through annual alumni and employer surveys to determine student employment levels and student performance on program identified competencies as well as the congruity between program competencies and industry success factors.

PROPOSED PROGRAM SUMMARY

Instituion: University of Kentucky
Program Name: Aerospace Engineering
Degree Designation: BACHELOR OF SCIENCE (BS)
Degree Level : Baccalaureate

Program Description

The proposed aerospace engineering BS degree program will provide a rigorous foundation in the fundamental principles of modern aerospace science and engineering. The program's main objective is to prepare its students for aerospace research and development in industry, government, and academia. The program will offer a comprehensive aerospace engineering curriculum like those at the top aerospace programs in the US, with instructors that are internationally-recognized researchers in the aerospace community.

The program will be housed in the Mechanical Engineering Department (envisioned to become Mechanical and Aerospace Engineering) and will be the only ABET accredited Aerospace Engineering program in Kentucky. This program meets a clearly demonstrated need, as currently 30 students per year (since 2011) leave the state through the common market to pursue Aerospace Engineering studies at other SEC schools. Aerospace Engineering is the second most common major that students leave the state using the common market program. Moreover, a survey of existing students in Engineering at UK indicated 150 students with current interest in a career in Aerospace and over 60 students that would choose Aerospace Engineering if it were available. The program will prepare students either for positions in the state's growing aerospace industry immediately following graduation or for advanced graduate studies.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
NO

CIP Code: 14.0201
Credit Hours: 127
Institutional Board Approval Date: 6/16/2021
Implementation Date: 8/16/2021

Student Demand

Year 1 - 20
Year 2 - 50
Year 3 - 80
Year 4 - 110
Year 5 - 140

Market Demand

Kentucky's aerospace exports are the third largest in the US, behind only California and Washington. The growing aerospace industry in Kentucky includes many prestigious companies, including General Electric, Lockheed Martin, Belcan Corporation, Raytheon Company, General Dynamics Group, and Sikorsky Aircraft Corporation. However, the state does not have an ABET accredited Aerospace Engineering program to support these industries.

The Kentucky Council on Postsecondary Education's (KY CPE) recent Engineering Sector Analysis in Kentucky (2020), projects a 23% increase in Aerospace Engineering demand over the next decade with over 20 new positions each year. Aerospace Engineers earn one of the highest wages among the engineering sector. At present, these employers must recruit from ABET accredited programs outside the state, and Kentucky high school students interested in an ABET accredited Aerospace Engineering program must attend other SEC schools. Approximately 30 students per year (average since 2011) leave the state to pursue Aerospace Engineering taking advantage of common market tuition. The most common destinations for these students are at the University of Alabama and Auburn University. A UK aerospace program would enhance Kentucky's aerospace industry by training proficient aerospace engineers locally and by enabling partnerships throughout the four-year program to include co-operative education and internships, student design projects, and research.

American Community Survey indicates that the average wage for individuals in this field is $64,680 for individuals Age <30 and $129,971 for individuals Age 30-60. Also, those Age <30 have a 3% unemployment rate and those Age 30-60 only have a 2% unemployment rate.

Employment Demand

	Regional	State	National
Type Of Job	**Aerospace Engineer (Architectural, Engineering, and related services; Aerospace Product and Parts Ma**		
Avg. Wage	$81,262	$84,542	$81,383
# Jobs (Postings)	25	11	4410
Expected Growth	14%	14%	6%

Indicate source of market demand information

Salary data is from Burning Glass that uses actual job postings over the last 12 months and was supplemented by BLS/OES 2018 data when burning glass was unavailable. Projections are BLS/OES, 2018 data from 2016-2026.

Academic Demand

NA

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
14633	00197600	Morehead State University	BS	Bachelor of Science in Space Systems Engineering	

Comparison of Objectives/Focus/Curriculum to Similar Programs:

Comparison of Student Populations:

Access to Existing Programs:

Feedback from Other Institutions:

Cost

Projected Revenue over Next Five Years ($) : 3214291
Projected Expenses over Next Five Years ($) : 3260200

Will Additional faculty be needed? Yes

The Aerospace Engineering program will require only 3 additional faculty. The Mechanical Engineering program has over the years developed an existing focus in Aerospace research including strong support from NASA, the Departments of Defense and industry. Many of our faculty in fact have degrees in Aerospace Engineering and our existing expertise is sufficient to cover most of the proposed BS curriculum. Two of the proposed new faculty positions will address the areas of aerospace structures and aerospace design, which is not fully covered by existing expertise. While expertise for the rest of the curriculum already exists in the ME department, those faculty teach existing ME courses. Thus, the other two positions are necessary to build up additional teaching capacity, particularly for

Provide a budgetary rationale for creating this new program

The only program significantly affected by this proposal is the Mechanical Engineering program, since its existing faculty with expertise in Aerospace Engineering may begin to split their course assignments between the two programs. The newly hired faculty positions will support this needed capacity.

Typical stand-alone Aerospace Engineering programs at other universities can consist of 15 or more faculty to cover the breadth of topics in the curriculum. Combined Mechanical and Aerospace Engineering programs are quite common as there is significant overlap in much of the material covered during the Sophomore curriculum and even some courses in the Junior year. For a typical ME-AER combined department, the faculty will consist of approximately 2/3-3/4 ME faculty and 1/4-1/3 AER faculty

Course Title (CIP)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
EGR	**101**	**Engineering Exploration I**	**Engineering Exploration I introduces students to the engineering and computer science professions, College of Engineering degree programs, and opportunities for career path exploration. Topics and assignments include study skills, team development, ethics, problem solving and basic engineering tools for modeling, analysis and visualization. Open to students enrolled in the College of Engineering. Students who received credit for EGR 112 are not eligible for EGR 101. Prereq: Enrolled in the College of Engineering or MA ACT of at least 23 or equivalent. Students who received credit for EGR 112 are not eligible for EGR 101.**	C	**1**	**E**
EGR	**102**	**Fundamentals of Engineering Computing**	**Fundamentals of Engineering Computing introduces students to the practice and principles of computer programming and computational problem solving. Students will engage in hands-on project-based problem solving using modern computer software and hardware, with a particular emphasis on problems and techniques commonly appearing in various domains of engineering. Open to students enrolled in the College of Engineering. Prereq: Enrolled in the College of Engineering or MA ACT of at least 23 or equivalent.**	C	**2**	**E**
CIS/WRD	**110**	**Composition and Communication I**	**Composition and Communication I is the introductory course in a two-course sequence designed to engage students in composing and communicating ideas using speech, writing, and visuals. Students will develop interpersonal communication, critical thinking, and information literacy skills by exploring what it means to be engaged, twenty-first century citizens. Students will practice composing, critiquing, and revising ideas based on personal experience, observation, and fieldwork in the community, culminating in several discrete projects using oral, written, and visual modalities.**	C	**3**	**E**
MA	**113**	**Calculus**	**A course in one-variable calculus, including topics from analytic geometry. Derivatives and integrals of elementary functions (including the trigonometric functions) with applications. Lecture, three hours; recitation, two hours per week. Students may not receive credit for MA 113 and MA 137. Prereq: Math ACT of 27 or above, or Math SAT of 620 or above, or Math SAT2016 of 650 or above, or a grade of C or better in MA 109 and in MA 112, or a grade of C or better in MA 110, or appropriate score on math placement test, or consent of the department. Students who enroll in MA 113 based on their test scores should have completed a year of pre- calculus study in high school that includes the study of trigonometric functions. Note: Math placement test recommended.**	**C**	**4**	**E**
PHY	**231**	**General University Physics**	**First part of a two-semester survey of classical physics. Consequences of the principles of mechanics are developed conceptually, analytically and quantitatively. Lecture, three hours; recitation, one hour per week. Prereq or concur: MA 113.**	**C**	**4**	**E**
PHY	**241**	**General University Physics Laboratory**	**A laboratory course offering experiments in mechanics and heat, framed in a small group environment that requires coordination and team work in the development of a well-written lab report. Prereq or concur: PHY 231.**	**C**	**1**	**E**
EGR	**103**	**Engineering Exploration II**	**Engineering Exploration II focuses on a semester long engineering design project with students working in teams to apply the skills and tools introduced in EGR 101 or EGR 112 for transfer students and EGR 102. Topics and assignments include more in depth exploration of engineering tools for modeling, analysis, visualization, programming, hardware interfacing, team development, documentation and communication. Students gain experience in project management, identifying constraints, iteration and technical report writing. Prereq: EGR 102 or equivalent; prereq or concur MA 113: prereq or concur PHY 231; prereq or concur; CHE 105**	**C**	**2**	**E**
MA	**114**	**Calculus II**	**A second course in Calculus. Applications of the integral, techniques of integration, convergence of sequence and series, Taylor series, polar coordinates. Lecture, three hours; recitation, two hours per week. Prereq: A grade of C or better in MA 113, MA 137 or MA 132.**	**C**	**4**	**E**
CIS/WRD	**111**	**Composition and Communication II**	**Composition and Communication II is the advanced course in a two-course sequence designed to engage students in composing and communicating ideas using speech, writing, and visuals. In this course, students will work in small groups to explore issues of public concern using rhetorical analysis, engage in deliberation, compose conscientious and well-developed arguments, and propose viable solutions to different audiences. Students will sharpen their ability to conduct research; compose and communicate in spoken, written, and visual forms; and work effectively in teams through sustained interrogation of an issue. A significant component of the class will involve learning to use visual and digital resources both to enhance written and oral presentations and to communicate with public audiences. Prereq: CIS 110.**	**C**	**3**	**E**
CHE	**105**	**General College Chemsitry I**	**A study of chemical principles and their application to pure and mixed substances. Not open to students who have already completed both CHE 109 and CHE 110. Prereq: Math ACT of 23 or above (or Math placement test), or MA 109, or MA 110.**	**C**	**4**	**E**
MA	**213**	**Calculus III**	**A course in multi-variable calculus. Topics include vectors and geometry of space, three-dimensional vector calculus, partial derivatives, double and triple integrals, integration on surfaces, Green's theorem. Optional topics include the Stokes theorem and the Gauss divergence theorem. Lecture, three hours; recitation, two hours per week. Prereq: A grade of C or better in MA 114 or in MA 138 or equivalent.**	**C**	**4**	**E**
PHYS	**232**	**General University Physics**	**A general course covering electricity, magnetism, electromagnetic waves and physical optics. Lecture, three hours; recitation, one hour per week. Prereq: PHY 231; concur: MA 213.**	**C**	**4**	**E**
PHYS	**242**	**General University Physics Laboratory**	**A laboratory course offering experiments in electricity, magnetism, and light, framed in a small group environment that requires coordination and team work in the development of a well written lab report. Prereq: PHY 241; concur: PHY 232.**	**C**	**1**	**E**

EM	**221**	**Statics**	Study of forces on bodies at rest. Vector algebra; study of force systems; equivalent force systems; distributed forces; internal forces; principles of equilibrium; application to trusses, frames and beams; friction. Prereq or concur: MA 21. Note: EM 302 is also included in this list, but the form does not allow the space for EM 302 or its description.	**C**	**3**	**E**
AER/ME	**251**	**Introduction to Materials and Manufacturing Processes**	**A background course in the areas of materials and manufacturing processes for mechanical engineers. Includes basic microstructure of materials, material properties and processing. Also includes an overview of casting, metal forming, machining, additive processing, nontraditional manufacturing processes, and manufacturing of non-metallic components. Prereq: MA 113, CHE 105.**	**C**	**3**	**E**
AER	**245**	**Introduction to Aerospace Engineering**	**This course provides an overview of the aerospace vehicle configuration design process. This course examines the conceptual approach from requirements definition, to initial sizing, configuration and layout through to final sizing and trade studies. An overview of design layout and design analysis is provided, leveraging elements from prior coursework in propulsion, aerodynamics and flight dynamics. Prereq: AE**	**C**	**3**	**N**
AER/ME	**220**	**Engineering Thermodynamics I**	**Fundamental principles of thermodynamics. Prereq: PHY 231; coreq: MA 213.**	**C**	**3**	**E**
EM	**302**	**Mechanics of Deformable Solids**	A study of stress and strain in deformable solids with application primarily to linear elastic materials: stress and strain transformations; simple tension and compression of axial members; torsion of shafts; bending of beams; combined loading of members; buckling of columns. Prereq: Registration in the College of Engineering or consent of chairperson, and EM 221; prereq or concur: MA 214.	**C**	**3**	**E**
MA	**214**	**Calculus IV**	**MA 214 is a course in ordinary differential equations. Emphasis is on first and second order equations and applications. The course includes series solutions of second order equations and Laplace transform methods. Prereq: MA 213 or equivalent.**	**C**	**3**	**E**
EM	**313**	**Dynamics**	Study of the motion of bodies. Kinematics: cartesian and polar coordinate systems; normal and tangential components; translating and rotating reference frames. Kinetics of particles and rigid bodies: laws of motion; work and energy; impulse and momentum. Prereq: Registration in College of Engineering, EM 221; prereq or concur: MA 214.	**C**	**3**	**E**
EE	**305**	**Electrical Circuits and Electronics**	A service course covering electrical engineering principles for engineering or science students with majors outside of electrical engineering. Topics include: AC and DC circuits analysis. Prereq: MA 114, PHY 232.	**C**	**3**	**E**
AER	**355**	**Engineering Analysis**	**This course is an introduction to the fundamentals of applied linear algebra and numerical methods for aerospace engineering applications. Major applied linear algebra topics include: vector spaces, basis and linear independence, matrices, range and null space, determinant, inverse, system of linear equations, linear least-squares problems, eigenvalues and eigenvectors, singular value decomposition, and solving systems of first-order linear ordinary differential equations. Major topics in numerical methods include: numerical methods for solving linear and nonlinear systems of equations (e.g., fixed-point iteration, Newton's method), numerical approaches to least-squares problems, numerical approximation of integrals, numerical approximation of derivatives, and numerical approaches for solving ordinary differential equations. Prereq: MA 214**	**C**	**3**	**N**
AER	**305**	**Aerospace Structures**	**This course will introduce fundamentals of aerospace structures, including the basic principles and practice of their design and analysis. Knowledge resulting from this course includes basic structural theories, as well as processes for conducting design trades, materials selection, and other key decision making in aerospace structures design and development. Aircraft and spacecraft designs often hinge on the strength and structural dynamic response of critical beam and thin-walled structures that will be addressed in this course. Prereq: Engineering standing, EM 202, EM 313**	**C**	**3**	**N**
AER/ME	**330**	**Fluid Mechanics**	**Introduction to the physical properties of fluids, fluid statics. Equations of conservation of mass, momentum and energy for systems and control volumes. Dimensional analysis and similarity. Principles of inviscid and real fluid flows including derivation and application of the Navier-Stokes equations. Flow through pipes and around bodies. Application and design of fluid handling systems. Prereq: Engineering standing, ME 220, and MA 214.**	**C**	**3**	**E**
WRD	**204**	**Technical Writing**	**Instruction and experience in writing for science and technology. Emphasis on clarity, conciseness, and effectiveness in preparing letters, memos, and reports for specific audiences. Prereq: Completion of University Writing requirement. This course is a Graduation Composition and Communication Requirement (GCCR) course in certain programs, and hence is not likely to be eligible for automatic transfer credit to UK.**	**C**	**3**	**E**

AER/ME	**310**	**Engineering Experimentation I**	**An introductory course in measurement and instrumentation emphasizing measurement errors, elementary statistics, uncertainty analysis, sensors, time and frequency response of instrumentation components, signal conditioning circuitry, and digital data acquisition. Applications include the measurement of strain, pressure, temperature, flow, force, torque, and vibration. Lecture, two hours; laboratory, three hours. Prereq: ME 101, ME 330, EE 305 and engineering standing. Prereq: ME 330, EE 305 and engineering standing. Prereq or coreq: ME 340**	**C**	**3**	**E**
AER	**320**	**Propulsion**	**This course examines the theory and fundamentals of cycle analysis for aerospace systems including gas-turbine engine power cycles and rocket engine systems. Fundamentals of combustion is covered including chemical equilibrium, adiabatic flame temperature and heat release. Introduction to fluid analysis for turbomachinery and alternative propulsion systems is included. Prereq: Engineering standing, ME 220, MA 214**	**C**	**3**	**N**
AER/ME	**325**	**Elements of Heat Transfer**	**Fundamental principles of conduction, convection, radiation heat transfer. Numerical methods for heat transfer problems. Design and applications of heat transfer equipment such as fins and heat exchangers. Prereq: ME 330, MA 214, and engineering standing**	**C**	**3**	**E**
AER	**345**	**Flight Dynamics**	**This course is an introduction to the flight dynamics of aircraft. Major topics include kinematic representations of aircraft, aerodynamic force modeling, aircraft equations of motion, flight stability and performance, and flight control design. Prereq: Engineering standing, EM 313, AE Mathematics**	**C**	**3**	**N**
AER	**335**	**Aerodynamics and Gas Dynamics**	**This course is intended to provide a basic introduction in aerodynamics for engineers. Topics will include some review of fluid mechanics, fundamentals of transonic, supersonic and hypersonic flows, as well as aerodynamic characterization of airfoils, wings and airplane configurations in the incompressible and compressible flow regimes. Prereq: Engineering standing, ME 330**	**C**	**3**	**N**
AER	**411**	**Capstone Design**	**The first semester of the capstone design sequence in mechanical engineering. Topics important in product design and manufacturing are included, including consideration of economics, safety, and communication. Students will develop a project plan concerned with the design of a complex system of current interest to mechanical engineers. Students will work in small groups and emphasis will be on original work. Lecture, two hours; laboratory/independent team work, three hours per week. Prereq: Engineering standing; prereq: EM 313, ME 205, ME 310, ME 325, ME 340, ME 344.**	**C**	**3**	**E**
AER	**410**	**Aerospace Engineering Lab**	**This is laboratory course intended to instruct the student in the performance of experiments. Topics will include principles of experiment design, considerations when conducting an experiment, experiment analysis and reporting. Prereq: Engineering standing, ME 310**	**C**	**3**	**N**
AER/ME	**440**	**Design of Control Systems**	**Fundamentals of classical control theory. Mathematical representation of feedback control systems using block diagrams and transfer functions. Design and analysis of feedback control systems using root-locus, Nyquist, and Bode methods to ensure system stability and meet desired system response specifications. Numerical simulation of feedback control systems. Prereq: ME 310, ME 340 and engineering standing.**	**C**	**3**	**E**
AER	**445**	**Aircraft Performance**	**This course provides an overview of the aerospace vehicle configuration design process. This course examines the conceptual approach from requirements definition, to initial sizing, configuration and layout through to final sizing and trade studies. An overview of design layout and design analysis is provided, leveraging elements from prior coursework in propulsion, aerodynamics and flight dynamics. Prereq: AE-Propulsion, AE-Aerodynamics and Gas Dynamics, AE-Aerospace Structures, AE-Flight Dynamics**	**C**	**3**	**N**
AER	**412**	**Capstone Design II**	**Second semester of the capstone design sequence in mechanical engineering. Students will complete a project concerned with the design of a complex system of current interest to mechanical engineers. Students will work in small groups and emphasis will be on original work. Topics include engineering ethics, design and communication. Lecture, 1 hour; lab 4 hours per week. Prereq: ME 411 and engineering standing. Course is to be taken semester immediately following ME 411.**	**C**	**3**	**E**
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) **Note: number recorded will automatically populate Core Hours in "Summary of Total Program Hours" table**		**103**	**NA**

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course

Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable) **Note: number recorded will automatically populate Program Option hours in "Summary of Total Program Hours" table**					**0**	**NA**
GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)						
Course Prefix	**Course #**	**Course Title**	**Course Description**	**Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)**	**Credit Hours**	**Existing (E) or New (N) Course**
# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table						**NA**
FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)						
Course Prefix	**Course #**	**Course Title**	**Course Description**	**Course Required for Program (P), Track (T), Concentration (C) or**	**Credit Hours**	**Existing (E) or New (N) Course**
AER	**380**	**Topics in Aerospace Engineering (Variable Topics)**	**A lecture-recitation course on a topic of current interest. Modern developments in aerospace engineering will be stressed. Offered as a technical elective in aerospace engineering. May be repeated to a maximum of nine credits. Prereq: Variable, given when topic identified and engineering standing.**		**3**	**N**
AER	**395**	**Independent Work in Aerospace Engineering**	**Special research and problems for individual students who wish to pursue independent investigations. Variable credit: may be repeated to a maximum of six credit hours for technical electives. A final report is required. Prereq: Consent of department chairperson.**		**3**	**N**
AER/ME/MFS	**501**	**Mechanical Design with Finite Element Methods**	**This course emphasizes mechanical design techniques based on the finite element method, using machine design background as the starting point. Techniques for modeling machine elements will be shown in relation to the basic FEM theory. Emphasis will be on quantifying loads, the resulting stress and deflection, and relating them to design allowables, leading to an acceptable design solution. Prereq or concur: Engineering Standing, ME 344 and ME 205; or Graduate standing or consent of instructor.**		**3**	**E**
AER/ME/MSE	**506**	**Mechanics of Composite Materials**	**A study of the structural advantages of composite materials over conventional materials, considering high strength-to-weight and stiffnessto-weight ratios. Fiber reinforced, laminated and particulate materials are analyzed. Response of composite structures to static and dynamic loads, thermal and environmental effects, and failure criteria are studied. Prereq: EM 302, engineering standing or consent of instructor. (Same as EM/MSE 506.)**		**3**	**E**
AER/ME/MSE	**510**	**Vibro-Acoustic Design in Mechanical Systems**	**Application of basic acoustics and vibrations to engineering problems in vibro-acoustic design. The objective is to acquaint the student with the tools used in industry for noise and vibration control and to make the student aware of the major applications of such tools in the automotive, aerospace, and consumer product industries. Prereq: ME 310, ME 340. This course is open only to graduate students or undergraduates with engineering standing.**		**3**	**E**
AER/ME	**513**	**Mechanical Vibrations**	**The analysis of vibrational motion of structural and mechanical systems. Single-degree-of-freedom systems; free vibrations; nonperiodic excitation; harmonic excitation. Modal analysis of multiple-degree-of-freedom systems. Vibration of continuous bodies, including strings and bars (axial, torsional and flexural modes). Energy methods. Prereq: EM 313 and EM 302, engineering standing or consent of instructor. (Same as MFS 513.)**		**3**	**E**
AER/ME	**514**	**Compuational Techniques in Mechancial System Analysis**	**Computer-based methods of analyzing mechanical systems are studied. The studies include the numerical solution techniques on which the analyses are based. Linear and nonlinear static and dynamic systems are analyzed. Finite element and other engineering software packages are used. Prereq: ME 340. This course is open only to graduate students or undergraduates with engineering standing.**		**3**	**E**
AER/ME	**516**	**Systems Engineering**	**Systems Engineering is a discipline necessary for cost-effective development of complex multi-disciplinary systems. Optimal design of modern systems for defense, transportation, telecommunications and energy, among other industries, requires a different perspective than the design of subsystems operating within them. This course presents principles and the practice of Systems Engineering, along with its origins in the aerospace and software industries, historical perspective and case studies of current interest. Topics include system lifecycle, requirements definition, modeling, personality, trade studies, design optimization (with minimal information), risk management, proposal writing and others. Guest lecturers and case studies provide a realistic setting for understanding the application of course materials. Prereq: Engineering Standing**		**3**	**E**

AER/ME	530	Gas Dynamics	Consideration of the mass, energy and force balances applied to compressible fluids. Isentropic flow, diabatic flow, flow with friction, wave phenomena and one-dimensional gas dynamics. Applications to duct flows and to jet and rocket propulsion engines. Prereq: ME 321, ME 330 and Engineering standing.		3	E
AER/ME	531	Fluid Dynamics I	Stress at a point (introduced as a tensor of rank two). Equation of conservation of mass, rate of strain tensor, derivation of Navier-Stokes equation, source-sink flows, motion due to a doublet, vortex flow, two- and three-dimensional irrotational flow due to a moving cylinder with circulation, two-dimensional airfoils. Prereq: ME 330, MA 432G and Engineering standing.		3	E
AER/ME	532	Advanced Strength of Materials	Unsymmetrical bending of beams, thin plates, stress analysis of thick-walled cylinders, and rotating discs. Theory of elastic energy, curved beams, stress concentration, and fatigue. Prereq: EM 302 and engineering standing. (Same as EM 531.)		3	E
AER/ME	548	Aerodynamics of Turbomachinery	Aerodynamic analysis and design of turbomachines (pumps, compressors and turbines). Blade element performance (deflection and losses), and models for performance prediction are present. Special topics - rotating stall and surge, and aeromechanical considerations. Prereq: ME 321 and ME 330. This course is open only to graduate students or undergraduates with engineering standing		3	E
AER	545	Aircraft Control and Simulation	This course is covers advanced topics in dynamics and control of atmospheric flight vehicles. Major topics include six-degrees-of-freedom kinematic representations of aircraft motion, aerodynamic force modeling, aircraft equations of motion, flight stability and performance, and flight control design.		3	N
AER/ME	563	Basic Combustion Phenomena	Simultaneous application of fluid mechanics, heat and mass transfer, chemical kinetics and thermodynamics to combustion. Topics covered include chemical kinetics, chain and thermal explosions, detonation and deflagration, flammability limits, stirred reactors. Flame stabilization in high and low velocity streams, laminar and turbulent diffusion flames, droplet burning, and metal combustion. Prereq: ME 321, ME 330, ME 325 and engineering standing; or graduate standing.		3	E
AER/ME/MSE	565	Scale Modeling in Engineering	A study of concepts of scale modeling in engineering applications. The course will include dimensionless numbers, scaling laws, and their application in engineering design and research. Prereq: ME 310, ME 321, ME 325. This course is open only to graduate students or undergraduates with engineering standing		3	E
AER/ME	590	Applied CFD and Numerical Heat Transfer	This course is an introduction to computational fluid dynamics (CFD) and numerical heat transfer for advanced undergraduate students who wish to become intelligent users of modern CFD tools. The emphasis will be on verification and validation of solutions obtained using CFD through comparison to analytical and empirical results. At the completion of this course, the student will have an appreciation for both the capabilities and limitations of modern CFD tools, as well as the ability to critically analyze a CFD solution to determine it's validity through post-processing and an understanding of flow phenomena		3	E
AER	599	Topics in Aerospace Engineering (Subtitle required)	A detailed investigation of a topic of current significance in aerospace engineering. May be repeated under different subtitles to a maximum of nine credits. A particular topic may be offered at most twice under the ME 599 number. Prereq: Variable; given when topic is identified. This course is open only to graduate students or undergraduates with engineering standing.		3	N
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)				**Note: number recorded will**	**9**	**NA**

Summary of Total Program Hours	**Required Core Hours (i.e., # of hours in degree program core)**	**103**	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	**0**	NA
	Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	**0**	NA
	Free Elective Hours (i.e., general program electives) (if applicable)	**9**	NA
	Total # of credit hours required for Program	**112**	**NA**
Information to be completed by PIE Office			
	# of new courses		NA
	Total # of Courses (includes new and existing)		NA
	Precentage of new courses (more than 25% may require SACS Substantive Change)	#VALUE!	NA

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14.0201-Aerospace, Aeronautical, and Astronautical/Space E
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Full Proposal - Basic Info

Institution :	University of Kentucky
Program Type :	Single Institution
Program Name :	Aerospace Engineering
Degree Level :	Baccalaureate
Degree Designation :	BACHELOR OF SCIENCE
CIP Code (2-Digit) :	14-ENGINEERING.
CIP Code :	14.0201-Aerospace, Aeronautical, and Astronautical/Space E
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2022 12:00:00 AM
Intended Date of Implementation :	8/1/2022
Date of Governing Board Approval :	5/4/2021

Institutional Contact Information

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Last Name : Weber
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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The proposed aerospace engineering BS degree program will provide a rigorous foundation in the fundamental principles of modern aerospace science and engineering. The program's main objective is to prepare its students for aerospace research and development in industry, government, and academia. The program will offer a comprehensive aerospace engineering curriculum like those at the top aerospace programs in the US, with instructors that are internationally-recognized researchers in the aerospace community.

The program will be housed in the Mechanical Engineering Department (envisioned to become Mechanical and Aerospace Engineering) and will be the only ABET accredited Aerospace Engineering program in Kentucky. This program meets a clearly demonstrated need, as currently 30 students per year (since 2011) leave the state through the common market to pursue Aerospace Engineering studies at other SEC schools. Aerospace Engineering is the second most common major that students leave the state using the common market program. Moreover, a survey of existing students in Engineering at UK indicated 150 students with current interest in a career in Aerospace and over 60 students that would choose Aerospace Engineering if it were available. The program will prepare students either for positions in the state's growing aerospace industry immediately following graduation or for advanced graduate studies.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

As Kentucky's flagship institution of higher education, UK's mission includes expanding educational opportunities to address current challenges and opportunities. UK's strategic plan for undergraduate-student success includes developing new undergraduate programs that increase professional opportunities in industry, public service, and academia (see 2015-2020 Strategic Plan, Undergraduate Student Success, Initiative 2).

Aerospace engineering is a growing occupation and an essential discipline for maintaining and advancing aircraft and spacecraft technologies. The proposed AER-BS program will open new opportunities for students who wish to pursue professional careers as aerospace engineers.

The AER program will also increase the breadth and recognition of the UK College of Engineering. Twenty of the top thirty US engineering schools (US News and World Report – 2021 Best Engineering Schools) offer an aerospace engineering BS degree. Moreover, the AER program supports the College of Engineering goal of expanding the current 3,900-student enrollment to 6,000 by 2025.

4. Is there a specialized accrediting agency related to this program?

Yes

4a. If yes, identify accreditor:

ABET

4b. Will accreditation be sought?

Yes

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5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

NA

6. Describe the rationale and need for the program to include how the institution determined need.

The proposed aerospace engineering (AER) BS program provides a rigorous foundation in the modern engineering theory, technology, and practice associated with design, development, testing, and production of aircraft, spacecraft, and related aerospace systems. As with all programs in the College of engineering, the proposed AER-BS program emphasizes fundamental mathematical, physical and engineering sciences along with the social sciences and humanities to ensure both a thorough education in engineering and a liberal education. The program has a 4-year curriculum that covers all the primary aerospace disciplines: aerodynamics, materials, structures, propulsion, vehicle dynamics, and control.
Kentucky's aerospace exports are the third largest in the US, behind only California and Washington. The growing aerospace industry in Kentucky includes many prestigious companies, including General Electric, Lockheed Martin, Belcan Corporation, Raytheon Company, General Dynamics Group, and Sikorsky Aircraft Corporation. However, the state does not have an ABET accredited Aerospace Engineering program to support these industries.
The Kentucky Council on Postsecondary Education's (KY CPE) recent Engineering Sector Analysis in Kentucky (2020), projects a 23% increase in Aerospace Engineering employer demand over the next decade with over 20 new positions each year. Aerospace Engineers earn one of the highest wages among the engineering sector. At present, these employers must recruit from ABET accredited programs outside the state, and Kentucky high school students interested in an ABET accredited Aerospace Engineering program must attend other SEC schools. Approximately 30 students per year (average since 2011) leave the state to pursue Aerospace Engineering taking advantage of common market tuition, this there is clearly demonstrated student demand as well. In fact Aerospace Engineering is the second most common major for students to leave the state using the common market. The most common destinations for these students are at the University of Alabama and Auburn University. A UK aerospace program would enhance Kentucky's aerospace industry by training proficient aerospace engineers locally and by enabling partnerships throughout the four-year program to include co-operative education and internships, student design projects, and research.
Aerospace Engineering programs offered within a combined Mechanical and Aerospace Engineering Department at comparable public universities in other states, show typical enrollments within AER to be about one-quarter to one-third of the enrollment in ME. The projected enrollment of new students to the college of engineering pursuing AER (30/year based on results of common market analysis of KY students seeking AER programs in other states and assuming similar rates of out-of-state enrollment as in ME) and students that would have enrolled in the college in another major (20/year conservatively estimated from student surveys) supports a steady state enrollment of 250 total students that is consistent with other state's MAE departments. Moreover, a survey of existing students in Engineering at UK indicated 150 students with current interest in a career in Aerospace and over 60 students that would choose Aerospace Engineering if it were available. The program will prepare students either for positions in the state's growing aerospace industry immediately following graduation or for advanced graduate studies.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The objectives of this program are to prepare students to:
1. Pursue successful professional careers in aerospace engineering or to pursue further graduate study
2. Become leaders in industry, academia, and public service be productive citizens with high professional and ethical standards
3. Use their engineering skills to make a positive impact in their community
4. Engage in continued professional development and life-long learning

2. Describe how the student learning outcomes for the program will be assessed.

Student outcomes for the proposed AE BS program are:
(SO1) Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(SO2) Apply engineering design to produces solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
(SO3) Communicate effectively with a range of audiences
(SO4) Recognize ethical and professional responsibilities, including impact of engineering solutions in global, economic, environmental, and societal contexts
(SO5) Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
(SO6) Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
(SO7) Acquire and apply new knowledge as needed, using appropriate learning strategies

3. Highlight any distinctive qualities of this proposed program.

The proposed AER BS program would be the only comprehensive aerospace engineering program in the state. Current UK faculty members who will support the AER program have degrees from, or have previously held appointments at: University of Michigan Department of Aerospace Engineering; Ohio State University Department of Aeronautical and Astronautical Engineering; Princeton University Department of Mechanical and Aerospace Engineering; UC Davis Department of Mechanical and Aerospace Engineering; Universität Stuttgart College of Aerospace Engineering; and ETSI Aeronauticos Universidad Politecnica de Madrid. In addition, these faculty members have non-academic experience from: NASA; Air Force Research Laboratory, The Aerospace Corporation, McDonnell Douglas Astronautics Co. (now Boeing); Harris Corporation's Government Aerospace Systems Division; and Pratt & Whitney. The ME faculty has active research programs in diverse range of aerospace fields: aerothermodynamic modeling of heat shields for atmospheric entry; combustion in aircraft systems; flow control; flight testing and control of unmanned aerial vehicles; compressible aerodynamics; control of rotorcraft; satellite guidance and control; inflatable structures for aerospace systems; spectral simulation in equilibrium and non-equilibrium airborne observation of re-entry; electric spacecraft propulsion; turbomachinery; and aircraft vortex flows. This diverse experience and research activity will be leveraged to provide students a state-of-the-art education in aerospace engineering.

In addition, UK is the host institution for the NASA Kentucky Space Grant Consortium and EPSCoR programs, which are aimed at promoting aerospace-related scientific and technological innovation. NASA KY provides many unique opportunities for UK undergraduate students to collaborate with NASA researchers on aerospace research projects.

4. Describe the admissions and graduation requirements for the program.

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Admission, retention, and completion standards for the proposed AER program conform to policies of the College of Engineering.

• Admission standards:
The program will use the College of Engineering admissions policy. This is:

To be accepted to the College of Engineering, high school students must have both:
• An ACT math score of 25 or higher, or the SAT equivalent of 590 or higher.
• An unweighted high school GPA of 3.0 or higher.

For students who meet the high school GPA requirement but not the ACT or SAT requirement, alternative admission routes include:
1. 3 or above on the Calculus AB portion of the Advanced Placement Exam, or
2. Eligibility to enter MA 110 based on the UK Proctored Math Department Placement Exam.

Transfer Students
Students who are not initially admitted into the College of Engineering may apply at a later date as a transfer student. To be accepted to the College of Engineering, transfer students must have a minimum cumulative college GPA of 2.5 and have completed MA 110 or its equivalent (or MA 109 and 112 or their equivalencies) with a grade of B or higher. Students who do not receive a B in these courses but who have completed calculus courses required in the Engineering curricula will be considered on a case-by-case basis.
Additionally, students must meet the minimum Kentucky statewide academic readiness requirements for Reading and Writing to be admitted to the College of Engineering:
• Reading: Students must have an ACT Reading subscore of 20 or above (or SAT subscore of 26 or above in Critical Reading);
• English/Writing: Students must have an ACT English subscore of 18 or above (or SAT of 25 or above in Writing).
Students who do not meet the reading/ writing requirements will be required to take the ACCUPLACER exam and receive a score of 244 or better. Students who do not meet the minimum score on the ACCUPLACER will be required to take APP courses (UK 120 for Reading and UK 130 for Writing) and can be considered for admission to the College of Engineering after successful completion of these courses.

International Students
Freshmen: In addition to meeting the requirements above, international freshman applicants must also obtain a Test of English as a Foreign Language (TOEFL) score of 71 or above or an International English Language Testing System (IELTS) score of 6.0 or above. Students who received a TOEFL score of 71 but less than 100 (IELTS score of 6.0 but less than 7.5) will be admitted to the College of Engineering but will be required to participate in English for Academic Purposes (EAP). If students do not meet the IELTS/TOEFL (6.0
or 71) or ACT/SAT requirements, they will be admitted to the College of Engineering after meeting the following criteria: attend ESL, meet EAP requirements, and complete the appropriate math class. They must retake the TOEFL and earn a minimum score of 71 or the IELTS and earn a minimum score of 6.0. Then they would apply for a change of major to Engineering.
Transfer: In addition to the requirements listed above, international transfer applicants must obtain a Test of English as a Foreign Language (TOEFL) score of 71 or above (527 paper-based); an International English Language Testing System (IELTS) score of 6.0 or above; or completion of the first and second English composition classes (e.g., ENG 101 and 102) from another US college, i.e., institution upon review. If students do not meet these requirements once they have completed UK's ESL program, they must retake the
TOEFL and earn a minimum score of 71 or the IELTS and earn a minimum score of 6.0.

• Retention standards: Retention standards for the AE BS program are prescribed by University Senate Rule 5.3.2.3. Retention standards are satisfied if cumulative standing is not less than 2.0 on a 4.0 scale.

• Completion standards: Students must complete all program courses and technical electives with a cumulative standing of not less than 2.0 on a 4.0 scale.

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5. Describe the administrative oversight to ensure the quality of the program.

The BS Aerospace program will be housed in the Mechanical Engineering Department, which currently has 39 faculty and oversees 1 undergraduate and 3 graduate programs. One of our faculty will be appointed as the Director of Undergraduate Studies (DUS) for the new BS Aerospace Program (a 15% administrative appointment) and will oversee course planning, student and program assessment, student advising, and any future curricular changes. The DUS will report to the Department Chair and will coordinate with the DUS for the ME program where resources and classes are shared. The Aerospace DUS will also chair an undergraduate studies committee consisting of at least 5 faculty that teach aerospace engineering courses. This committee will review assessment materials annually and will be the committee to primarily review any required student exceptions and any proposed changes to course syllabi or program structure. Any changes recommended by this committee will then be approved by vote of the full department faculty. This structure mirrors our administration of the BS ME program. While the DUS for Aerospace will be distinct from the DUS for ME, other department resources including staff for budgeting, purchasing, faculty affairs, scheduling, etc. will be shared with ME. We presently have 11 staff in the department.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Not applicable

7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	127	100	9	18

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

Since AER is not currently offered at UK, students in Kentucky who wish to pursue a traditional aerospace-engineering education must go outside of the state. Under the common market, every year students attend universities outside of the state (while paying in-state tuition) to pursue studies not available in Kentucky. Aerospace engineering is currently the second largest common-market subject area. Over the past 10 years, approximately 30 students per year from Kentucky enrolled in an aerospace engineering BS program outside of the state. Alabama, Alabama-Huntsville, and Auburn have attracted the majority of these students. Some Kentucky residents also enroll in aerospace engineering programs outside of the common market.

Interest in AER is also captured by activities of current UK students. Based on co-ops, internships, and research lab participation, we estimate that approximately 150 UK students are currently pursuing an aerospace career. The aerospace certificate program has awarded 38 certificates in the last 5 years. In addition, each year between 5-10 UK undergraduates leave UK to pursue advanced AE degrees at another university.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2022-23	0	50
2023-24	0	100
2024-25	0	150
2025-26	40	200
2026-27	50	250

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Aerospace Engineering	81262	225	14.0	84542	11	14.0	81383	4410	6.0
Mechanical Engineering	64117	1069	2.0	64117	581	0.0	73069	63290	8.0

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2b. Clearly describe evidence of employer demand.

Aerospace engineers are employed to design or build aircraft, spacecraft, satellites, missiles, and supporting aerospace systems. Aerospace engineers are employed by industry, academia, and government labs for manufacturing, analysis and design, and research and development.

At the state level, Kentucky is home to 79 aerospace-related facilities, which employ over 19,000 people. Aerospace is the top export in the state, and Kentucky is third leading aerospace exporter in the US, behind California and Washington. In 2019, Kentucky exported more than $14.6 billion in aerospace products and parts, a 16.4% increase from the previous year. The aerospace industry in Kentucky consists of many prestigious companies, including General Electric, Lockheed Martin, Belcan Corp., Raytheon, General Dynamics Group, and Sikorsky Aircraft Corp. Kentucky's Cabinet for Economic Development Kentucky has indicated that aerospace is a primary focus for job creation and retention. Since 2014, Kentucky has announced 62 aerospace-related projects, totaling more than $2.7 billion in investment and the announcement of nearly 4,000 jobs.

At the regional level, the Southeast United States has some of the world's most advanced aviation manufacturing companies, industry suppliers, and research and development institutions. Moreover, the Southeast region is home to 5 NASA centers and facilities. A 2015 national workforce study by Aviation Week Network found that the highest percentage job growth for the aerospace industry is in the Southeast region.

At the national level, aerospace is one of the healthiest industrial segments of the US economy. The US accounts for approximately half of the world's global aerospace production. Aerospace & Defense is the largest US deficit reducing industry, effectively cutting the federal trade deficit by 10% ("2019 Facts & Figures: U.S. Aerospace & Defense", Aerospace Industries Association). Employment of aerospace engineers in the US is projected to grow 6% from 2018 to 2028, according to the US Bureau of Labor Statistics. There are also many emerging aerospace employment opportunities. The unmanned aerial vehicle (UAV) market is projected to grow at a rate of 10% from 2016 to 2024. Investment in space companies (e.g., SpaceX, OneWeb, and Telesat) reached a record high in 2018; and Morgan Stanley projects that the global space industry could generate revenue of more than $1 trillion by 2040, up from $350 billion currently.

In 2019, two Southeast region schools were among the top 5 US universities in supporting the aerospace & defense workforce. Specifically, Georgia Tech and Central Florida were among the top 5 universities for preferred suppliers of aerospace engineers, and Central Florida currently leads the nation in supplying graduates for aerospace & defense.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

Not Applicable

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

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4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

The Morehead Space Systems Engineering program is focused exclusively on astronautical engineering and space systems*, whereas the broader field of Aerospace Engineering includes aeronautics and other related areas. The proposed UK Aerospace Engineering program will offer a broad ABET accredited program that includes both sections of aerospace engineering. The required curriculum includes courses in flight mechanics, propulsion, and aerospace structures that are not part of a pure astronautic (space) program like at Morehead. Their program is more specialized, where our proposed program would provide broad coverage of Aerospace Engineering consistent with programs at other state's major universities. Moreover, our program will be offered from the Mechanical Engineering department that will also include proposed MS and PhD programs in Aerospace Engineering. There is a strong research focus from faculty that will teach in both the PhD and BS programs, providing deep opportunities for undergraduate based research and preparation for graduate studies. The existing program in the state does not offer the full breadth of Aerospace Engineering. The Morehead program has a strong focus on space systems that will meet the needs of students with this well-defined interest, but this does not cover many aspects of the Aerospace Engineering field. As the state's flagship research university, an Aerospace Engineering program at UK can serve to attract out of state and international students to the program. Our faculty met with the chair of Morehead's Space Systems Engineering program. They were in support of our program and offered the following comments: Their program is exclusively space systems and they have no coverage of aeronautics. We identified this in our proposals but he did confirm that that is completely unique coverage in the UK proposal.
Their program currently has about 110 students enrolled and that is all they can handle with the way it is staffed. They are not currently trying to grow the program because of this limitation.
They are not ABET accredited but they are intending to seek accreditation for the BS and MS program. Since they don't have any ABET programs yet, they have to go through an initial readiness review prior to preparing an official accreditation visit so they are probably still a couple years away. We discussed their faculty arrangement and this is likely going to be a hurdle for ABET.
Their MS program is very small with 8 students total. He said they cannot have international students work on their projects so this limits enrollment.
In addition to not having concerns about our program, he is interested in how our program could help them by having additional course options for their students nearby. Currently if a student gets off track with one of their classes they send them to other universities to pick up a class and catch up since they don't offer everything each year. He thought having additional options in Lexington could end up being useful for their students.

4b - How will the program support or be supported by other programs within the institution?

The proposed AER BS program will be integrated into the Mechanical Engineering Department, which may be renamed the Mechanical and Aerospace Engineering Department (or similar).

AER and ME undergraduates will share a similar curriculum. Specifically, the proposed AER BS curriculum and the current ME-BS curriculum consist of 127 credit hours, have the same premajor requirements, share some major requirements, and have some common technical electives. The AER BS major requirements consist of 8 new and distinct core courses (24 credit hours). curriculum.

The 8 new AE courses will be instructed by current ME faculty and new faculty hires. The current ME faculty includes members who have AER degrees and members who have significant research experience in an AER discipline. Each new faculty hires will have an AER degree or extensive research experience in an AER discipline.

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

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#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
Morehead State University	*Bachelor of Science in Space Systems Engineering	100		70	13								

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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Internal					
Allocation :	230400	230400	230400	230400	230400
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	Two faculty positions in Aerospace Engineering to support the program were already budgeted in AY 19-20. The positions were frozen during the COVID hiring pause. Two positions will be supported by the college prior to the start of the program, with a third position to be hired during the first year of the program. These are budgeted at $90,000 each plus 28% benefits.				
Student Tuition					
New :	103115	257786	412458	567130	721802
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Tuition return is computed from number of students * net tuition return asssuming 30% of current tuition rates. The tuition rate is assumed to be 25% out-of-state and 75% in-state, based on actual rates in Mechanical Engineering. # students * 0.3 * (0.25 * $31,294 + 0.75 * $12,483). No tuition increases are projected.				
Total					
New :	$333,515	$488,186	$642,858	$797,530	$952,202
Existing :	$0	$0	$0	$0	$0
Total Funding Sources :	$333,515	$488,186	$642,858	$797,530	$952,202

B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	17000	17000	17000	17000	17000

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Existing :	0	0	0	0	0
Other Professional					
New :	121600	121600	121600	166400	166400
Existing :	0	0	0	0	0
Faculty					
New :	230400	345600	345600	345600	345600
Existing :	0	0	0	0	0
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	72960	72960	72960	72960	72960
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	The Aerospace Engineering program will be administered by existing staff in the Mechanical Engineering department until the student enrollment warrants additional staffing. One month per year of faculty support is budgeted for a Director of Undergraduate Studies . One part time advisor ($30k) and one full time technician ($65k) are budgeted starting with the first year of the program. 28% benefits are assumed. The advisor is assumed to be full time ($65k) starting year 4. Three new faculty are anticipated for the program. Two should be hired for the first year of the program and the third hired for the second year. Salary is assumed at $90,000 + 28% benefits. Four TAs are budgted to support the 8 new required UG courses. Salary is assumed to be $14,250 (750/pp x 19 weeks) + 28% benefits.				
Equipment and Instructional Materials					
New :	420000	20000	20000	20000	20000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	$400,000 is budgeted for laboratory equipment to build a new junior level lab course. The equipment will include a wind tunnel and equipment for aerosapce materials/structures testing. Annual expenses of $20,000 are budgeted to support lab supplies.				
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total					
New :	$861,960	$577,160	$577,160	$621,960	$621,960
Existing :	$0	$0	$0	$0	$0
Total Budget Expenses/Requirements :	$861,960	$577,160	$577,160	$621,960	$621,960
Grand Total					
Total Net Cost :	$-528,445	$-88,974	$65,698	$175,570	$330,242

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

Post-graduate success will be evaluated using an alumni survey, similar to that currently implemented by the ME department. Each year a detailed survey will be completed by program alumni from 1 and 5 years after graduation. The questions request information on their experiences since graduation and perspectives on the AE program. Some of the questions are indirectly associated with the student outcomes. For each question, the alumni are asked to evaluate the importance of the topic, as well as their level of preparation by the program.

PROPOSED PROGRAM SUMMARY

Instituion: University of Kentucky
Program Name: Aerospace Engineering
Degree Designation: MASTER OF SCIENCE (MS)
Degree Level : Master's

Program Description

The proposed aerospace engineering master's degree program will provide a rigorous foundation in the fundamental principles of modern aerospace science and engineering. The program's main objective is to prepare its students for aerospace research and development in industry, government, and academia. The program will offer a comprehensive aerospace engineering curriculum, similar to those at the top aerospace programs in the US, with instructors that are active researchers in the aerospace community.

The program is motivated by an increasing aerospace industry within Kentucky, increasing demand from students for a structured Aerospace program at UK, and the existence of sufficient faculty expertise within the Mechanical Engineering Department at UK to offer such a program with minimal investment.

The proposed aerospace engineering master's program offers a thesis option and a

non-thesis option. The thesis option, which is intended for full-time graduate students, requires a minimum of 24 semester hours of coursework and 6 credit hours of thesis research, along with the thesis. The non-thesis option, which is intended for part-time students who are employed, requires a minimum of 30 semester hours of coursework.

The University of Kentucky's mission includes promoting economic development and improving people's lives through excellence in education and research. The proposed aerospace program supports UK's mission by increasing scientific discovery and innovation in aerospace, and by supporting the local aerospace industry with a highly-skilled workforce.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
NA

CIP Code: 14.0201
Credit Hours: 30

Institutional Board Approval Date: 6/16/2021
Implementation Date: 8/16/2021

Student Demand

Year 1 - 5
Year 2 - 10
Year 3 - 15
Year 4 - 15
Year 5 - 15

Market Demand

Currently, undergraduate students in Mechanical Engineering that wish to pursue graduate degrees in Aerospace Engineering must look for those opportunities at other universities, and this regularly occurs with approximately 5-10 students each year pursuing AER advanced degrees elsewhere following completion of their BS in ME at UK. The current enrollment in the Mechanical Engineering MS program is approximately 35 students with approximately 15 graduates per year. At typical joint Mechanical and Aerospace Engineering departments in other states about 1/3 of the total department students are in the Aerospace Program, thus we expect a steady enrollment of approximately 15 students, with annual MS graduates of 6-7 students and annual new enrollments of 7-10 students. These are consistent with the demand we see just from our own BS graduates. While this is a modest number of students, we note that the existing expertise of Mechanical Engineering faculty in Aerospace fields permits this program to be launched with no required hires. The companion proposal to start a BS program in Aerospace Engineering will support hiring of several additional faculty. Thus, while the MS program can start without the BS program, the BS program will expand aerospace expertise and permit additional courses to be added to the curriculum over time.

The anticipated rates of MS graduates matches well with current regional and state demand not accounting for the projected 14% growth in this area over the coming decade.

Employment Demand

	Regional	State	National
Type Of Job	**Aerospace Engineering (Architectural, Engineering, and related services; Aerospace Product and Parts**		
Avg. Wage	$87	$98,650	$84,186
# Jobs (Postings)	15	7	1987
Expected Growth	14%	14%	6%

Indicate source of market demand information

Salary data is from Burning Glass that uses actual job postings over the last 12 months and was supplemented by BLS/OES 2018 data when burning glass was unavailable. Projections are BLS/OES, 2018 data from 2016-2026.

Academic Demand

NA

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
10090	00197600	Morehead State University	MS	Space Systems Engineering	2015

Comparison of Objectives/Focus/Curriculum to Similar Programs:
Morehead State University offers an MS in Space Systems Engineering. Their program is focused on systems-level engineering for spacecraft design, development and operation (1). The program emphasizes astronautics and satellite systems. The required curriculum includes classes in Spacecraft Design, Spacecraft Sensors, Space Communications, and Space Mission Design. The MSU program is very specialized in satellite systems.

The proposed MS in Aerospace Engineering at UK is a broad more traditional Aerospace Engineering program with courses available in applications of aeronautics, propulsion, and aerospace controls. The course requirements for students are built around the requirements for their specific research projects. The research focus in the department in aerospace applications does include some satellite control, but also include computational modeling for hypersonics, combustion for aerospace propulsion, and control for aeronautics and astronautic systems. The companion proposal to develop a BS in AER will also support the hiring of faculty with expertise in aerospace structures and materials. These areas are part of a more comprehensive aerospace engineering program.

https://www.moreheadstate.edu/study/MS-spacesystemsengineering

Comparison of Student Populations:
Both the MSU and UK MS programs are residential programs and both require students to have an undergraduate degree in mechanical or aerospace engineering or related area. The primary difference in student population surrounds the students interest within aerospace engineering. Students seeking study in other areas of aerospace engineering except for satellite systems do not have an option within any program in Kentucky. The proposed MS AER program at UK will provide broad opportunities for students interested in aeronautics, aerospace structures, hypersonics, and other areas. The MSU program will continue to appeal to students with a specific interest in satellite systems.

Access to Existing Programs:
The existing program does not cover the broader areas of Aerospace Engineering proposed here.

Feedback from Other Institutions:
Requested

Cost

Projected Revenue over Next Five Years ($) : 324912
Projected Expenses over Next Five Years ($) : 161800

Will Additional faculty be needed? Yes

No. Additional faculty will be hired as part of the companion proposal to develop a BS program in AER, and those faculty will bring new expertise that will be valuable to the MS program. However, existing expertise is sufficient and no faculty are required just for the MS program.

Provide a budgetary rationale for creating this new program

The Mechanical Engineering Department has developed a significant expertise in aerospace applications over the years. Present funding for research in the department is already about 1/3 in the Aerospace area with major funding coming from NASA as well as form the Department of Defense. Our elective courses in Mechanical Engineering have been developed to fit the needs of this aerospace oriented research and we find ourselves with sufficient expertise, capacity and course offerings to launch an Aerospace Engineering MS program with no additional resources. Initial courses for the AER MS program can take full advantage of courses already developed to meet research needs. As the program grows and new faculty are hired, particularly if the BS program is also approved, additional courses wi

Course Title (CIP)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
AER	768	Residence Credit for Master's Degree	Residence credit for MS students. May be repeated to a maximum of 12 hours.		1-6	N
AER	799	Aerospace Engineering Graduate Seminar	A series of talks presented by national and local speakers that will provide graduate students with an overview of current research activities in the broad field of Aerospace Engineering.		0	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core)	Note:	6	NA

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable)	Note: number recorded	0	NA

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
AER/ME/MFS	501	Mechanical Design with Finite Element Methods	This course emphasizes mechanical design techniques based on the finite element method, using machine design background as the starting point. Techniques for modeling machine elements will be shown in relation to the basic FEM theory. Emphasis will be on quantifying loads, the resulting stress and deflection, and relating them to design allowables, leading to an acceptable design solution. Prereq or concur: Engineering Standing, ME 344 and ME 205; or Graduate standing or consent of instructor.		3	E
AER/ME/MSE	506	Mechanics of Composite Materials	A study of the structural advantages of composite materials over conventional materials, considering high strength-to-weight and stiffnessto-weight ratios. Fiber reinforced, laminated and particulate materials are analyzed. Response of composite structures to static and dynamic loads, thermal and environmental effects, and failure criteria are studied. Prereq: EM 302, engineering standing or consent of instructor. (Same as EM/MSE 506.)		3	E
AER/ME/MSE	510	Vibro-Acoustic Design in Mechanical Systems	Application of basic acoustics and vibrations to engineering problems in vibro-acoustic design. The objective is to acquaint the student with the tools used in industry for noise and vibration control and to make the student aware of the major applications of such tools in the automotive, aerospace, and consumer product industries. Prereq: ME 310, ME 340. This course is open only to graduate students or undergraduates with engineering standing.		3	E
AER/ME/MSE	513	Mechanical Vibrations	The analysis of vibrational motion of structural and mechanical systems. Single-degree-of-freedom systems; free vibrations; nonperiodic excitation; harmonic excitation. Modal analysis of multiple-degree-of-freedom systems. Vibration of continuous bodies, including strings and bars (axial, torsional and flexural modes). Energy methods. Prereq: EM 313 and EM 302, engineering standing or consent of instructor. (Same as MFS 513.)		3	E
AER/ME/MSE	514	Compuational Techniques in Mechancial System Analysis	Computer-based methods of analyzing mechanical systems are studied. The studies include the numerical solution techniques on which the analyses are based. Linear and nonlinear static and dynamic systems are analyzed. Finite element and other engineering software packages are used. Prereq: ME 340. This course is open only to graduate students or undergraduates with engineering standing.		3	E
AER/ME/MSE	516	Systems Engineering	Systems Engineering is a discipline necessary for cost-effective development of complex multi-disciplinary systems. Optimal design of modern systems for defense, transportation, telecommunications and energy, among other industries, requires a different perspective than the design of subsystems operating within them. This course presents principles and the practice of Systems Engineering, along with its origins in the aerospace and software industries, historical perspective and case studies of current interest. Topics include system lifecycle, requirements definition, modeling, personality, trade studies, design optimization (with minimal information), risk management, proposal writing and others. Guest lecturers and case studies provide a realistic setting for understanding the application of course materials. Prereq: Engineering Standing		3	E
AER/ME/MSE	530	Gas Dynamics	Consideration of the mass, energy and force balances applied to compressible fluids. Isentropic flow, diabatic flow, flow with friction, wave phenomena and one-dimensional gas dynamics. Applications to duct flows and to jet and rocket propulsion engines. Prereq: ME 321, ME 330 and Engineering standing.		3	E
AER/ME/MSE	531	Fluid Dynamics I	Stress at a point (introduced as a tensor of rank two). Equation of conservation of mass, rate of strain tensor, derivation of Navier-Stokes equation, source-sink flows, motion due to a doublet, vortex flow, two- and three-dimensional irrotational flow due to a moving cylinder with circulation, two-dimensional airfoils. Prereq: ME 330, MA 432G and Engineering standing.		3	E
AER/ME/MSE	532	Advanced Strength of Materials	Unsymmetrical bending of beams, thin plates, stress analysis of thick-walled cylinders, and rotating discs. Theory of elastic energy, curved beams, stress concentration, and fatigue. Prereq: EM 302 and engineering standing. (Same as EM 531.)		3	E
AER	545	Aircraft Control and Simulation	This course is covers advanced topics in dynamics and control of atmospheric flight vehicles. Major topics include six-degrees-of-freedom kinematic representations of aircraft motion, aerodynamic force modeling, aircraft equations of motion, flight stability and performance, and flight control design.		3	N

AER/ME/MSE	563	Basic Combustion Phenomena	Simultaneous application of fluid mechanics, heat and mass transfer, chemical kinetics and thermodynamics to combustion. Topics covered include chemical kinetics, chain and thermal explosions, detonation and deflagration, flammability limits, stirred reactors. Flame stabilization in high and low velocity streams, laminar and turbulent diffusion flames, droplet burning, and metal combustion. Prereq: ME 321, ME 330, ME 325 and engineering standing; or graduate standing.		3	E
AER/ME/MSE	565	Scale Modeling in Engineering	A study of concepts of scale modeling in engineering applications. The course will include dimensionless numbers, scaling laws, and their application in engineering design and research. Prereq: ME 310, ME 321, ME 325. This course is open only to graduate students or undergraduates with engineering standing		3	E
AER/ME	590	Applied CFD and Numerical Heat Transfer	This course is an introduction to computational fluid dynamics (CFD) and numerical heat transfer for advanced undergraduate students who wish to become intelligent users of modern CFD tools. The emphasis will be on verification and validation of solutions obtained using CFD through comparison to analytical and empirical results. At the completion of this course, the student will have an appreciation for both the capabilities and limitations of modern CFD tools, as well as the ability to critically analyze a CFD solution to determine it's validity through post-processing and an understanding of flow phenomena		3	E
AER	599	Topics in Aerospace Engineering (Subtitle required)	A detailed investigation of a topic of current significance in aerospace engineering. May be repeated under different subtitles to a maximum of nine credits. A particular topic may be offered at most twice under the ME 599 number. Prereq: Variable; given when topic is identified. This course is open only to graduate students or undergraduates with engineering standing.		3	N
AER/ME	613	Nonlinear Oscillations	Many physical systems exhibit some nonlinear behavior. This course presents some methods of analyzing discrete, nonlinear, dynamical systems and applies the methods to typical mechanical systems. Various kinds of nonlinear behavior, including resonance phenomena such as harmonics, parametric excitation, and discontinuous jumps in amplitude are considered. Lyapunov stability criteria and Floquet and Routhian procedures for performing stability analyses of systems are introduced, and their physical interpretations for various systems are studied		3	E
AER/ME	620	Advanced Engineering Thermodynamics	Critical treatment of the laws of thermodynamics, relations among thermodynamic properties; stability of systems; thermodynamic processes; selected special topics.		3	E
AER	629	Transport in Porous Media	Mass, energy and force balance applied to incompressible and compressible fluids. Analysis of the mathematical and physical models that describes these flows: scale analysis, averaging methods and interface conditions.		3	N
AER/ME	631	Fluid Dynamics II	A continuation of ME 531 with emphasis on viscous flow. Exact and approximate solutions, boundary layer theory. Jets, wakes, rotatingsystems, compressible boundary layer and hydrodynamic stability.		3	E
AER	632	Hypersonics	Fluid dynamics and heat transfer applied to hypersonic flows. Flight dynamics, aerothermodynamics, surface phenomenon, boundary layers, propulsion and thermal protection systems.		3	N
AER/ME	634	Turbulent Flows	Physical and analytical description of turbulent flows, isotropic turbulence, boundary layers and shear flows, free turbulence in jets and wakes. Measurement techniques.		3	E
AER	640	Advanced Measurement Techniques	This course will survey a broad collection of advance optical measurement techniques with particular focus on measurements of flow fields (velocimetry), temperature, and species concentrations. The course material is relevant to measurements in thermal/fluids systems including analysis of thermal transport and chemical reactions. Geometric optical system design will be covered in detail as will issues associated with data analysis of optical system measurements. Specific topics will include resonant spectroscopic techniques, non-resonant scattering techniques and quantitative imaging.		3	N
AER/ME	641	Foundations of Solid Mechanics	A brief review of vectors and an in-depth discussion of tensors and tensor calculus. Stress, deformation and strain. Continuum balance principles of mass, momentum and energy, the equations of motion and the energy equation. Entropy, the principles of material frame indifference and material symmetry. Various constitutive models, including elasticity (linear and/or non-linear), plasticity and viscoelasticity. Thermoelasticity, hyperelasticity, hypoelasticity, and electroelasticity may also be addressed.		3	E
AER/ME	644	Advanced Dynamics I	Many physical systems in engineering involve rigid bodies in translation and rotation. Such motions are studied in this course by the use of Euler's Laws. The kinematical description of the motions utilize the concept of reference frames. The inertia properties of rigid bodies, and the energy functions for rigid bodies are covered. Analytical and numerical solutions of dynamical systems of engineering interest are considered.		3	E
AER/ME	645	Advanced Control System Analysis	Conceptual development and study of complex systems; their synthesis and design; analysis and optimization of system parameters. Inputoutput relationships; formulation of mathematical models, parameters and constraints on physical systems.		3	E
AER/ME	647	System Optimization I	Introduction to linear and nonlinear optimization and their use in engineering design. Emphasis on numerical approaches and use of optimization methods for engineering systems (e.g. biological, mechanical, structural).		3	E
AER	674	Robust Control	This course presents methods for analyzing and controlling linear time-invariant (LTI) dynamic systems with model uncertainty. This course focuses on single-input single-output (SISO) systems and frequency-domain techniques. The major topics include: basic frequency-domain design techniques, fundamental limitations to performance for SISO systems, uncertainty modeling and robustness, the robust stabilization control problem, and the robust performance control problem.		3	N
AER	676	Robot Modeling and Control	This course teaches students about what it takes to make robots move the way we want them to move. There are three parts to the course. The first part discusses how to represent robot position and motion mathematically. The second part focuses on planning motions. The third part focuses on controlling the robot to achieve motion. In some cases, the planning and control are tied together. Throughout the course, students will use simulations to apply the concepts they are learning.		3	N
AER/ME	687	Nonlinear Systems and Control	This course presents methods for analyzing and controlling nonlinear dynamic systems. The major topics are: 1) fundamental properties of nonlinear ordinary differential equations such as existence and uniqueness; 2) Lyapunov stability theory; and 3) nonlinear feedback control techniques such as backstepping, feedback linearization, and Lyapunov-based design.		3	E
AER/ME	691	CFD I - Incompressible Flows	This course will cover a control-volume CFD approach for the conservation of momentum, heat and mass transfer. The emphasis will be on the discretization of the transport equations in general coordinates and its application in both structured and unstructured grid arrangements. Modern numerical schemes and pressure solution algorithms will also be covered. An introduction of turbulence modeling will be provided. At the end of the lecture, the students not only are able to understand the basics of commercial software but also will be able to write a general coordinate code for fluid flow, heat and mass transfer applications.		3	E
AER/ME	692	CFD II - Compressible Flows	This second course shall focus on the solution of the compressible Navier-Stokes equations. The Van-Leer's and Roe's approaches will be discussed to derive the discretization equations. Modern shock capturing schemes, such as FCT, TVD and ENO will be introduced. The solution techniques such as ADI, DDADI and line-relaxation will be used to solve the system of equations. Multi-grid acceleration techniques will be introduced to speed up the rate of convergence. Finally, the parallelization of CFD codes using shared and distributed computers will be discussed.		3	E
AER	699	Topics in Aerospace Engineering (Subtitle required)	A detailed investigation of a topic of current significance in aerospace engineering. May be repeated under different subtitles to a maximum of nine credits. A particular topic may be offered at most twice under the AER 699 number.		3	N
AER	748	Master's Thesis Research	Half-time to full-time work on thesis. May be repeated to a maximum of six semesters.		0	N
AER	780	Special Problems in Aerospace Engineering	This course consists of individual work in one aspect of aerospace engineering. May be repeated three times for a maximum of 9 credits.		3	N
AER	790	Research in Aerospace Engineering	Work may be taken in any field of aerospace engineering, subject to the approval of the director of graduate studies. May be used to satisfy pre-qualifying examination residency credit. May be repeated to a maximum of 18 hours.		1-9	N

# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table					24	NA
FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)				Note:	0	NA

Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)	6	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	0	NA
	Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	24	NA
	Free Elective Hours (i.e., general program electives) (if applicable)	0	NA
	Total # of credit hours required for Program	30	NA
Information to be completed by PIE Office			
	# of new courses	13	NA
	Total # of Courses (includes new and existing)	36	NA
	Precentage of new courses (more than 25% may require SACS Substantive Change)	36%	NA

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MS - MASTER OF SCIENCE
14.0201-Aerospace, Aeronautical, and Astronautical/Space E
Submission Date: 05/03/2021 11:43

Full Proposal - Basic Info

Institution :	University of Kentucky
Program Type :	Single Institution
Program Name :	Aerospace Engineering
Degree Level :	Master's
Degree Designation :	MASTER OF SCIENCE
CIP Code (2-Digit) :	14-ENGINEERING.
CIP Code :	14.0201-Aerospace, Aeronautical, and Astronautical/Space E
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	5/4/2021

Institutional Contact Information

First Name :	Annie
Last Name :	Weber
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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The Aerospace Engineering (AER) MS program provides advanced programs of study and research opportunities in the modern engineering theory, technology, and practice associated with design, development, testing, and production of aircraft, spacecraft, and related aerospace systems. The program is designed to prepare its students for aerospace research and development in industry, government, and academia. The program offers a comprehensive aerospace engineering curriculum, similar to those at the top aerospace programs in the US, with instructors and advisors who are recognized researchers in the aerospace community.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

As Kentucky's flagship institution of higher education, UK's mission includes expanding educational opportunities to address current challenges and opportunities. Aerospace engineering is a growing occupation and an essential discipline for maintaining and advancing aircraft and spacecraft technologies. The proposed AER-MS program will open new opportunities for students who wish to pursue professional careers as aerospace engineers.

The University of Kentucky's mission also includes promoting economic development and improving people's lives through excellence in education and research. The proposed aerospace program supports UK's mission by increasing scientific discovery and innovation in aerospace, and by supporting the local aerospace industry with a highly-skilled workforce.

The proposed aerospace program supports UK's strategic plan by expanding and enhancing an emerging area of strength in research (see 2015-2020 Strategic Plan, Graduate Education, Strategic 2). UK's mechanical engineering department currently has active research programs in several diverse aerospace fields, including aerothermodynamic modeling of heat shields for atmospheric entry, combustion in aircraft systems, flow control, flight testing and control of unmanned aerial vehicles, compressible aerodynamics, control of rotorcraft, small satellite control, inflatable structures for aerospace systems, spectral simulation in equilibrium and non-equilibrium airborne observation of re-entry, electric spacecraft propulsion, turbomachinery, and aircraft vortex flows. These research activities will be enhanced and expanded by a dedicated degree program.

4. Is there a specialized accrediting agency related to this program?

No

4a. If yes, identify accreditor:

4b. Will accreditation be sought?

No

5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

NA

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6. Describe the rationale and need for the program to include how the institution determined need.

The Aerospace Engineering (AER) MS program provides advanced study and research opportunities in modern engineering theory, technology, and practice associated with design, development, testing, and production of aircraft, spacecraft, and related aerospace systems. The program is designed to prepare its students for aerospace research and development in industry, government, and academia. The program offers a comprehensive aerospace engineering curriculum, similar to those at the top aerospace programs in the US, with instructors and advisors who are recognized researchers in the aerospace community.

The program is motivated by an increasing aerospace industry within Kentucky, increasing demand from students for a structured Aerospace program at UK, and the existence of sufficient faculty expertise within the Mechanical Engineering Department at UK to offer such a program with minimal investment.

The program will be housed in the Mechanical Engineering department, which has developed faculty expertise in many aspects of Aerospace Engineering. At least 8 existing faculty have active research programs in Aerospace Engineering areas already, and numerous elective courses that have been developed in ME cover Aerospace Engineering topics and are regularly offered. There is sufficient critical mass of people, courses and research opportunities to offer the AER MS degree with no significant additional investment. This proposal accompanies a related proposal to develop an undergraduate BS program in AER as well. That program will require additional faculty hiring, initially consisting of three faculty, and more as the program grows naturally. These faculty hired to support the BS program will also be teaching and conducting research in the graduate programs contributing to additional electives and research opportunities over time.

Currently, undergraduate students in Mechanical Engineering that wish to pursue graduate degrees in Aerospace Engineering must look for those opportunities at other universities, and this regularly occurs with approximately 5-10 students each year pursuing AE advanced degrees elsewhere following completion of their BS in ME at UK. The current enrollment in the Mechanical Engineering MS program is approximately 35 students with approximately 15 graduates per year. At typical joint Mechanical and Aerospace Engineering departments in other states about 1/3 of the total department students are in the Aerospace Program, thus we expect a steady enrollment of approximately 15 students, with annual MS graduates of 6-7 students and annual new enrollments of 7-10 students. These are consistent with the demand we see just from our own BS graduates. While this is a modest number of students, we note that the existing expertise of Mechanical Engineering faculty in Aerospace fields permits this program to be launched with no required hires. The companion proposal to start a BS program in Aerospace Engineering will support hiring of several additional faculty. Thus, while the MS program can start without the BS program, the BS program will expand aerospace expertise and permit additional courses to be added to the curriculum over time.

There is clear demand from students, and capacity to offer the program with no significant additional resources and no major impact on existing programs in the department. The anticipated rates of MS graduates matches well with current regional and state demand not accounting for the projected 14% growth in this area over the coming decade. The proposed aerospace engineering master’s program offers a thesis option and a non-thesis option. The thesis option, which is intended for full-time graduate students, requires a minimum of 24 semester hours of coursework and 6 credit hours of thesis research, along with the thesis. The non-thesis option, which is intended for part-time students who are employed, requires a minimum of 30 semester hours of coursework.

The University of Kentucky’s mission includes promoting economic development and improving people’s lives through excellence in education and research. The proposed aerospace program supports UK’s mission by increasing scientific discovery and innovation in aerospace, and by supporting the local aerospace industry with a highly-skilled workforce.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The objectives of this program are to prepare students to:
1. Pursue successful professional careers in aerospace engineering or to pursue further graduate study
2. Become leaders in industry, academia, and public service be productive citizens with high professional and ethical standards
3. Use their engineering skills to make a positive impact in their community
4. Engage in continued professional development and life-long learning

2. Describe how the student learning outcomes for the program will be assessed.

(SO1) A mastery of the fundamental principles of aerospace engineering and in-depth knowledge of the state of the art in student's chosen field
(SO2) The ability to identify, investigate, formulate, and solve new problems through scholarly research
(SO3) The ability to communicate technical concepts both orally and in writing
(SO4) Understanding of professional and ethical responsibilities

3. Highlight any distinctive qualities of this proposed program.

The proposed AER MS program would be the only comprehensive aerospace engineering program in the state. Current UK faculty members who will support the AER program have degrees from, or have previously held appointments at: University of Michigan Department of Aerospace Engineering; Ohio State University Department of Aeronautical and Astronautical Engineering; Princeton University Department of Mechanical and Aerospace Engineering; UC Davis Department of Mechanical and Aerospace Engineering; Universität Stuttgart College of Aerospace Engineering; and ETSI Aeronauticos Universidad Politecnica de Madrid. In addition, these faculty members have non-academic experience from: NASA; Air Force Research Laboratory, The Aerospace Corporation, McDonnell Douglas Astronautics Co. (now Boeing); Harris Corporation's Government Aerospace Systems Division; and Pratt & Whitney. The ME faculty has active research programs in diverse range of aerospace fields: aerothermodynamic modeling of heat shields for atmospheric entry; combustion in aircraft systems; flow control; flight testing and control of unmanned aerial vehicles; compressible aerodynamics; control of rotorcraft; satellite guidance and control; inflatable structures for aerospace systems; spectral simulation in equilibrium and non-equilibrium airborne observation of re-entry; electric spacecraft propulsion; turbomachinery; and aircraft vortex flows. This diverse experience and research activity will be leveraged to provide students a state-of-the-art education in aerospace engineering.

In addition, UK is the host institution for the NASA Kentucky Space Grant Consortium and EPSCoR programs, which are aimed at promoting aerospace-related scientific and technological innovation. NASA KY provides many unique opportunities for UK undergraduate students to collaborate with NASA researchers on aerospace research projects.

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4. Describe the admissions and graduation requirements for the program.

Admission, retention, and completion standards for the proposed AE program conform to policies of the Graduate School.

Admission Standards:
Applicants seeking admission to the AER graduate program must have an awarded baccalaureate degree. Admission to the AER graduate programs normally requires a Bachelor's degree in engineering (not necessarily in Aerospace Engineering) and a grade point average (GPA) of 3.0/4.0 or 70% on all graduate and undergraduate work, as well as Graduate Record Examination (GRE) scores of at least 300 (new scoring system) for the combined Quantitative and Verbal sections (with at least 160 on the quantitative section) and 3.5 for the Analytical section. An undergraduate degree in Mathematics, Chemistry or Physics combined with a strong interest in engineering topics may be suitable preparation when certain required undergraduate courses are taken. Exceptions to these requirements may be made by the Director of Graduate Studies if other persuasive evidence of the student's potential for success is available. All international students, except those with a degree from a U.S. institution, must have a minimum score of 550 (paper), 213 (computer), or 79 (Internet) on the Test of English as a Foreign Language (TOEFL), or an IELTS score of 6.5.
Retention Standards:
Students will be placed on scholastic probation if they have completed 12 or more semester hours of graduate coursework with a cumulative GPA of less than 3.0. Students will have one full-term semester, or the equivalent (9 hours), to remove the scholastic probation by attaining a 3.0 cumulative GPA. If probation is not removed after one semester, or 9 credit hours, the student will be dismissed from the Graduate School. Progress of each graduate student will be reviewed by the DGS, in consultation with the Graduate Studies Committee and the student's academic advisor, once each academic year, or more often for students on scholastic probation. If a student does not make satisfactory progress in coursework and/or research, that student shall be dismissed from the graduate program.

Completion Standards:
Students have 6 years to complete all degree requirements. Extensions up to an additional 4 years may be granted. Extensions up to 2 years may be approved by the Dean of the Graduate School or designate. Requests for extensions longer than 2 years must be considered by the Graduate Council. Students must complete all graduate coursework with a cumulative standing of not less than 3.0 on a 4.0 scale, and there must be no outstanding incomplete grades.

5. Describe the administrative oversight to ensure the quality of the program.

The MS Aerospace program will be housed in the Mechanical Engineering Department, which currently has 39 faculty and oversees 1 undergraduate and 3 graduate programs. One of our faculty will be appointed as the Director of Graduate Studies (DGS) for the new MS Aerospace Program (a 15% administrative appointment) and will oversee course planning, student and program assessment, student advising, and any future curricular changes. The DGS will report to the Department Chair and will coordinate with the DGS for the ME program where resources and classes are shared. The Aerospace DGS will also chair a graduate studies committee consisting of at least 5 faculty that teach aerospace engineering graduate courses. This committee will review program assessment and will be the committee to primarily review any required student exceptions and any proposed changes to course syllabi or program structure. Any changes recommended by this committee will then be approved by vote of the full department faculty. This structure mirrors our administration of the MS ME program. While the DGS for Aerospace will be distinct from the DGS for ME, other department resources including staff for budgeting, purchasing, faculty affairs, scheduling, etc. will be shared with ME. We presently have 11 staff in the department.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Not Applicable

7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	30	6	24	

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

Currently, undergraduate students in Mechanical Engineering who wish to pursue graduate degrees in Aerospace Engineering must look for those opportunities at other universities, and this regularly occurs with approximately 5-10 students each year pursuing AER advanced degrees elsewhere following completion of their BS in ME at UK. The current enrollment in the Mechanical Engineering MS program is approximately 35 students with approximately 15 graduates per year. At typical joint Mechanical and Aerospace Engineering departments in other states about 1/3 of the total department students are in the Aerospace Program, thus we expect a steady enrollment of approximately 15 students, with annual MS graduates of 6-7 students and annual new enrollments of 7-10 students. These are consistent with the demand we see just from our own BS graduates. While this is a modest number of students, we note that the existing expertise of Mechanical Engineering faculty in Aerospace fields permits this program to be launched with no required hires. The companion proposal to start a BS program in Aerospace Engineering will support hiring of several additional faculty. Thus, while the MS program can start without the BS program, the BS program will expand aerospace expertise and permit additional courses to be added to the curriculum over time. The anticipated rates of MS graduates matches well with current regional and state demand not accounting for the projected 14% growth in this area over the coming decade.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	5
2022-23	0	10
2023-24	5	15
2024-25	10	15
2025-26	15	15

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Aerospace Engineering	87534	15	14.0	98650	7	14.0	84186	1987	6.0

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2b. Clearly describe evidence of employer demand.

Aerospace engineers are employed to design or build aircraft, spacecraft, satellites, missiles, and supporting aerospace systems. Aerospace engineers are employed by industry, academia, and government labs for manufacturing, analysis and design, and research and development.

At the state level, Kentucky is home to 79 aerospace-related facilities, which employ over 19,000 people. Aerospace is the top export in the state, and Kentucky is third leading aerospace exporter in the US, behind California and Washington. In 2019, Kentucky exported more than $14.6 billion in aerospace products and parts, a 16.4% increase from the previous year. The aerospace industry in Kentucky consists of many prestigious companies, including General Electric, Lockheed Martin, Belcan Corp., Raytheon, General Dynamics Group, and Sikorsky Aircraft Corp. Kentucky's Cabinet for Economic Development Kentucky has indicated that aerospace is a primary focus for job creation and retention. Since 2014, Kentucky has announced 62 aerospace-related projects, totaling more than $2.7 billion in investment and the announcement of nearly 4,000 jobs.

At the regional level, the Southeast United States has some of the world's most advanced aviation manufacturing companies, industry suppliers, and research and development institutions. Moreover, the Southeast region is home to 5 NASA centers and facilities. A 2015 national workforce study by Aviation Week Network found that the highest percentage job growth for the aerospace industry is in the Southeast region.

At the national level, aerospace is one of the healthiest industrial segments of the US economy. The US accounts for approximately half of the world's global aerospace production. Aerospace & Defense is the largest US deficit reducing industry, effectively cutting the federal trade deficit by 10% ("2019 Facts & Figures: U.S. Aerospace & Defense", Aerospace Industries Association). Employment of aerospace engineers in the US is projected to grow 6% from 2018 to 2028, according to the US Bureau of Labor Statistics. There are also many emerging aerospace employment opportunities. The unmanned aerial vehicle (UAV) market is projected to grow at a rate of 10% from 2016 to 2024. Investment in space companies (e.g., SpaceX, OneWeb, and Telesat) reached a record high in 2018; and Morgan Stanley projects that the global space industry could generate revenue of more than $1 trillion by 2040, up from $350 billion currently.

In 2019, two Southeast region schools were among the top 5 US universities in supporting the aerospace &defense workforce. Specifically, Georgia Tech and Central Florida were among the top 5 universities for preferred suppliers of aerospace engineers, and Central Florida currently leads the nation in supplying graduates for aerospace & defense.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

Not Applicable

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

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4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

Morehead State University offers an MS in Space Systems Engineering. Their program is focused on systems-level engineering for spacecraft design, development and operation (1). The program emphasizes astronautics and satellite systems. The required curriculum includes classes in Spacecraft Design, Spacecraft Sensors, Space Communications, and Space Mission Design. The MSU program is very specialized in satellite systems.

The proposed MS in Aerospace Engineering at UK is a broad more traditional Aerospace Engineering program with courses available in applications of aeronautics, propulsion, and aerospace controls. The course requirements for students are built around the requirements for their specific research projects. The research focus in the department in aerospace applications does include some satellite control, but also include computational modeling for hypersonics, combustion for aerospace propulsion, and control for aeronautics and astronautic systems. The companion proposal to develop a BS in AER will also support the hiring of faculty with expertise in aerospace structures and materials. These areas are part of a more comprehensive aerospace engineering program. Both the MSU and UK MS programs are residential programs and both require students to have an undergraduate degree in mechanical or aerospace engineering or related area. The primary difference in student population surrounds the students interest within aerospace engineering. Students seeking study in other areas of aerospace engineering except for satellite systems do not have an option within any program in Kentucky. The proposed MS AER program at UK will provide broad opportunities for students interested in aeronautics, aerospace structures, hypersonics, and other areas. The MSU program will continue to appeal to students with a specific interest in satellite systems.

4b - How will the program support or be supported by other programs within the institution?

The proposed AER MS program will be integrated into the Mechanical Engineering (ME) Department, which may be renamed the Mechanical and Aerospace Engineering Department (or similar). Course offerings include cross-listings with ME, Manufacturing Systems Engineering (MFS), and Materials Science and Engineering (MSE). All AER, AER/ME, and AER/ME/MFS courses will be instructed by ME faculty. All AER/MSE courses will be instructed by MSE or ME faculty. Current ME faculty who will instruct AER courses have AER degrees or significant research experience in an AER discipline. Each new faculty hire who will instruct AER courses will have an AER degree and extensive research experience in an AER discipline.

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
Morehead State University	*Space Systems Engineering	5		6	4	17	5	17	2	11	4	10	2

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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Internal					
Allocation :	0	0	0	0	0
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	Not applicable				
Student Tuition					
New :	27076	54152	81228	81228	81228
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Student tuition is projected based on current in-state tuition rates ($13,538) and projected enrollment (5/10/15/15/15) multiplied by 40% for current net tuition revenue returned to college.				
Total					
New :	$27,076	$54,152	$81,228	$81,228	$81,228
Existing :	$0	$0	$0	$0	$0
Total Funding Sources :	$27,076	$54,152	$81,228	$81,228	$81,228

B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	17000	17000	17000	17000	17000
Existing :	0	0	0	0	0
Other Professional					
New :	0	0	0	0	0
Existing :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Faculty					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Part time support (1/4 time = $25,600) for a staff member to assist with administrative tasks is budgeted starting in Year 3, when the program research its steady state enrollment. Support for a Director of Graduate Studies ($17,000) is budgeted starting in Year 1 .The program will be housed in the Mechanical Engineering department, which has developed faculty expertise in many aspects of Aerospace Engineering. At least 8 existing faculty have active research programs in Aerospace Engineering areas already, and numerous elective courses that have been developed in ME cover Aerospace Engineering topics and are regularly offered. From these 8 existing faculty, a portion of each of their time will be devoted to supervising AER graduate student theses and advising AER students. Some portion of the teaching capacity of these faculty will also be devoted to new aerospace engineering courses over time. Finally, one faculty member will serve as the Director of Graduate Studies, which is a 15% administrative appointment. We estimate that the total faculty time for this program from existing faculty is equivalent to 2 FTE faculty.				
Equipment and Instructional Materials					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total					
New :	$17,000	$17,000	$17,000	$17,000	$17,000
Existing :	$0	$0	$0	$0	$0
Total Budget Expenses/Requirements :	$17,000	$17,000	$17,000	$17,000	$17,000
Grand Total					
Total Net Cost :	$10,076	$37,152	$64,228	$64,228	$64,228

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

Post-graduate success will be evaluated using an alumni survey. Each year a detailed survey will be completed by program alumni from 1 and 5 years after graduation. The questions request information on their experiences since graduation and perspectives on the AER MS program. Some of the questions are associated with the student outcomes. For each question, the alumni are asked to evaluate the importance of the topic, as well as their level of preparation by the program.

PROPOSED PROGRAM SUMMARY

Instituion: University of Kentucky
Program Name: Aerospace Engineering
Degree Designation: DOCTOR OF PHILOSOPHY (PHD)
Degree Level : Doctor's Degree Research/Scholarship

Program Description

The proposed aerospace engineering PhD degree program will provide a rigorous foundation in the fundamental principles of modern aerospace science and engineering. The program's main objective is to prepare its students for aerospace research and development in industry, government, and academia. The program will offer a comprehensive aerospace engineering curriculum, similar to those at the top aerospace programs in the US, with instructors who are active researchers in the aerospace community.

The program is motivated by an increasing aerospace industry within Kentucky, increasing demand from students for a structured Aerospace program at UK, and the existence of sufficient faculty expertise within the Mechanical Engineering Department at UK to offer such a program with minimal investment.

The aerospace engineering PhD program degree is a research degree granted on the basis of demonstrated broad knowledge of aerospace engineering and in-depth study in a specific area leading to a dissertation reflecting original work by the doctoral candidate. Degree requirements consist of coursework, a written preliminary examination, an oral qualifying examination, and a final dissertation defense.

The University of Kentucky's mission includes promoting economic development and improving people's lives through excellence in education and research. The proposed aerospace program supports UK's mission by increasing scientific discovery and innovation in aerospace, and by supporting the local aerospace industry with a highly-skilled workforce.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
NA

CIP Code: 14.0201
Credit Hours: 36
Institutional Board Approval Date: 6/16/2021

Implementation Date: 8/16/2021

Student Demand

Year 1 - 5
Year 2 - 10
Year 3 - 15
Year 4 - 20
Year 5 - 25

Market Demand

Currently, undergraduate students in Mechanical Engineering that wish to pursue graduate degrees in Aerospace Engineering must look for those opportunities at other universities, and this regularly occurs with approximately 5-10 students each year pursuing AER advanced degrees elsewhere following completion of their BS in ME at UK. The current enrollment in the Mechanical Engineering PhD program is approximately 65 students with approximately 10 graduates per year. At typical joint Mechanical and Aerospace Engineering departments in other states about 1/3 of the total department students are in the Aerospace Program, thus we expect a steady enrollment of approximately 25 students, with annual PhD graduates of about 5 students. These are consistent with the demand we see just from our own BS graduates. While this is a modest number of students, we note that the existing expertise of Mechanical Engineering faculty in Aerospace fields permits this program to be launched with no required hires. The companion proposal to start a BS program in Aerospace Engineering will support hiring of several additional faculty. Thus, while the PhD program can start without the BS program, the BS program will expand aerospace expertise and permit additional courses to be added to the curriculum over time. Moreover, those faculty will support additional PhD students that will contribute to growth in this program.

Employment Demand

	Regional	State	National
Type Of Job	**Aerospace Engineering (Industry: College, University)**		
Avg. Wage	$71,091	$98,650	$75,498
# Jobs (Postings)	11	2	165
Expected Growth	14%	14%	6%
Type Of Job	**Aerospace Engineering (Industry: Scientific Research and Dev; Architectural and Engineering; Aerospa**		
Avg. Wage	$112,480	$0	$84,685
# Jobs (Postings)	4	0	845
Expected Growth	14%	0%	6%

Indicate source of market demand information

Salary data is from Burning Glass that uses actual job postings over the last 12 months and was supplemented by BLS/OES 2018 data when burning glass was unavailable. Projections are BLS/OES, 2018 data from 2016-2026.

Academic Demand

NA

Unneccessary Duplication

Similar Program(s):

Comparison of Objectives/Focus/Curriculum to Similar Programs:

Comparison of Student Populations:

Access to Existing Programs:

Feedback from Other Institutions:

Cost

Projected Revenue over Next Five Years ($) : 406140
Projected Expenses over Next Five Years ($) : 0

Will Additional faculty be needed? Yes

No. Additional faculty will be hired as part of the companion proposal to develop a BS program in AER, and those faculty will bring new expertise that will be valuable to the PhD program. However, existing expertise is sufficient and no faculty are required just for the PhD program.

Provide a budgetary rationale for creating this new program

The Mechanical Engineering Department has developed a significant expertise in aerospace applications over the years. Present funding for research in the department is already about 1/3 in the Aerospace area with major funding coming from NASA as well as form the Department of Defense. Our elective courses in Mechanical Engineering have been developed to fit the needs of this aerospace oriented research and we find ourselves with sufficient expertise, capacity and course offerings to launch an Aerospace Engineering PhD program with no additional resources. Initial courses for the AER PhD program can take full advantage of courses already developed to meet research needs. As the program grows and new faculty are hired, particularly if the BS program is also approved, additional courses

Course Title (CIP)						
Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)						
Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
AER	767	Dissertation Residency Credit	Residency credit for dissertation research after the qualifying examination. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.		2	N
AER	799	Aerospace Engineering Graduate Seminar	A series of talks presented by national and local speakers that will provide graduate students with an overview of current research activities in the broad field of Aerospace Engineering.		0	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core)	Note: number recorded will	4	NA
Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable)	Note: number recorded will	0	NA
GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
AER/ME/MFS	501	Mechanical Design with Finite Element Methods	This course emphasizes mechanical design techniques based on the finite element method, using machine design background as the starting point. Techniques for modeling machine elements will be shown in relation to the basic FEM theory. Emphasis will be on quantifying loads, the resulting stress and deflection, and relating them to design allowables, leading to an acceptable design solution. Prereq or concur: Engineering Standing, ME 344 and ME 205; or Graduate standing or consent of instructor.		3	E
AER/ME/MSE	506	Mechanics of Composite Materials	A study of the structural advantages of composite materials over conventional materials, considering high strength-to-weight and stiffnessto-weight ratios. Fiber reinforced, laminated and particulate materials are analyzed. Response of composite structures to static and dynamic loads, thermal and environmental effects, and failure criteria are studied. Prereq: EM 302, engineering standing or consent of instructor. (Same as EM/MSE 506.)		3	E
AER/ME/MSE	510	Vibro-Acoustic Design in Mechanical Systems	Application of basic acoustics and vibrations to engineering problems in vibro-acoustic design. The objective is to acquaint the student with the tools used in industry for noise and vibration control and to make the student aware of the major applications of such tools in the automotive, aerospace, and consumer product industries. Prereq: ME 310, ME 340. This course is open only to graduate students or undergraduates with engineering standing.		3	E
AER/ME/MSE	513	Mechanical Vibrations	The analysis of vibrational motion of structural and mechanical systems. Single-degree-of-freedom systems; free vibrations; nonperiodic excitation; harmonic excitation. Modal analysis of multiple-degree-of-freedom systems. Vibration of continuous bodies, including strings and bars (axial, torsional and flexural modes). Energy methods. Prereq: EM 313 and EM 302, engineering standing or consent of instructor. (Same as MFS 513.)		3	E
AER/ME/MSE	514	Compuational Techniques in Mechancial System Analysis	Computer-based methods of analyzing mechanical systems are studied. The studies include the numerical solution techniques on which the analyses are based. Linear and nonlinear static and dynamic systems are analyzed. Finite element and other engineering software packages are used. Prereq: ME 340. This course is open only to graduate students or undergraduates with engineering standing.		3	E
AER/ME/MSE	516	Systems Engineering	Systems Engineering is a discipline necessary for cost-effective development of complex multi-disciplinary systems. Optimal design of modern systems for defense, transportation, telecommunications and energy, among other industries, requires a different perspective than the design of subsystems operating within them. This course presents principles and the practice of Systems Engineering, along with its origins in the aerospace and software industries, historical perspective and case studies of current interest. Topics include system lifecycle, requirements definition, modeling, personality, trade studies, design optimization (with minimal information), risk management, proposal writing and others. Guest lecturers and case studies provide a realistic setting for understanding the application of course materials. Prereq: Engineering Standing		3	E
AER/ME/MSE	530	Gas Dynamics	Consideration of the mass, energy and force balances applied to compressible fluids. Isentropic flow, diabatic flow, flow with friction, wave phenomena and one-dimensional gas dynamics. Applications to duct flows and to jet and rocket propulsion engines. Prereq: ME 321, ME 330 and Engineering standing.		3	E
AER/ME/MSE	531	Fluid Dynamics I	Stress at a point (introduced as a tensor of rank two). Equation of conservation of mass, rate of strain tensor, derivation of Navier-Stokes equation, source-sink flows, motion due to a doublet, vortex flow, two- and three-dimensional irrotational flow due to a moving cylinder with circulation, two-dimensional airfoils. Prereq: ME 330, MA 432G and Engineering standing.		3	E
AER/ME/MSE	532	Advanced Strength of Materials	Unsymmetrical bending of beams, thin plates, stress analysis of thick-walled cylinders, and rotating discs. Theory of elastic energy, curved beams, stress concentration, and fatigue. Prereq: EM 302 and engineering standing. (Same as EM 531.)		3	E
AER	545	Aircraft Control and Simulation	This course is covers advanced topics in dynamics and control of atmospheric flight vehicles. Major topics include six-degrees-of-freedom kinematic representations of aircraft motion, aerodynamic force modeling, aircraft equations of motion, flight stability and performance, and flight control design.		3	N
AER/ME/MSE	563	Basic Combustion Phenomena	Simultaneous application of fluid mechanics, heat and mass transfer, chemical kinetics and thermodynamics to combustion. Topics covered include chemical kinetics, chain and thermal explosions, detonation and deflagration, flammability limits, stirred reactors. Flame stabilization in high and low velocity streams, laminar and turbulent diffusion flames, droplet burning, and metal combustion. Prereq: ME 321, ME 330, ME 325 and engineering standing; or graduate standing.		3	E

AER/ME/MSE	565	Scale Modeling in Engineering	A study of concepts of scale modeling in engineering applications. The course will include dimensionless numbers, scaling laws, and their application in engineering design and research. Prereq: ME 310, ME 321, ME 325. This course is open only to graduate students or undergraduates with engineering standing		3	E
AER/ME	590	Applied CFD and Numerical Heat Transfer	This course is an introduction to computational fluid dynamics (CFD) and numerical heat transfer for advanced undergraduate students who wish to become intelligent users of modern CFD tools. The emphasis will be on verification and validation of solutions obtained using CFD through comparison to analytical and empirical results. At the completion of this course, the student will have an appreciation for both the capabilities and limitations of modern CFD tools, as well as the ability to critically analyze a CFD solution to determine it's validity through post-processing and an understanding of flow phenomena		3	E
AER	599	Topics in Aerospace Engineering (Subtitle required)	A detailed investigation of a topic of current significance in aerospace engineering. May be repeated under different subtitles to a maximum of nine credits. A particular topic may be offered at most twice under the ME 599 number. Prereq: Variable; given when topic is identified. This course is open only to graduate students or undergraduates with engineering standing.		3	N
AER/ME	613	Nonlinear Oscillations	Many physical systems exhibit some nonlinear behavior. This course presents some methods of analyzing discrete, nonlinear, dynamical systems and applies the methods to typical mechanical systems. Various kinds of nonlinear behavior, including resonance phenomena such as harmonics, parametric excitation, and discontinuous jumps in amplitude are considered. Lyapunov stability criteria and Floquet and Routhian procedures for performing stability analyses of systems are introduced, and their physical interpretations for various systems are studied		3	E
AER/ME	620	Advanced Engineering Thermodynamics	Critical treatment of the laws of thermodynamics, relations among thermodynamic properties; stability of systems; thermodynamic processes; selected special topics.		3	E
AER	629	Transport in Porous Media	Mass, energy and force balance applied to incompressible and compressible fluids. Analysis of the mathematical and physical models that describes these flows: scale analysis, averaging methods and interface conditions.		3	N
AER/ME	631	Fluid Dynamics II	A continuation of ME 531 with emphasis on viscous flow. Exact and approximate solutions, boundary layer theory. Jets, wakes, rotating systems, compressible boundary layer and hydrodynamic stability.		3	E
AER	632	Hypersonics	Fluid dynamics and heat transfer applied to hypersonic flows. Flight dynamics, aerothermodynamics, surface phenomenon, boundary layers, propulsion and thermal protection systems.		3	N
AER/ME	634	Turbulent Flows	Physical and analytical description of turbulent flows, isotropic turbulence, boundary layers and shear flows, free turbulence in jets and wakes. Measurement techniques.		3	E
AER	640	Advanced Measurement Techniques	This course will survey a broad collection of advance optical measurement techniques with particular focus on measurements of flow fields (velocimetry), temperature, and species concentrations. The course material is relevant to measurements in thermal/fluids systems including analysis of thermal transport and chemical reactions. Geometric optical system design will be covered in detail as will issues associated with data analysis of optical system measurements. Specific topics will include resonant spectroscopic techniques, non-resonant scattering techniques and quantitative imaging.		3	N
AER/ME	641	Foundations of Solid Mechanics	A brief review of vectors and an in-depth discussion of tensors and tensor calculus. Stress, deformation and strain. Continuum balance principles of mass, momentum and energy, the equations of motion and the energy equation. Entropy, the principles of material frame indifference and material symmetry. Various constitutive models, including elasticity (linear and/or non-linear), plasticity and viscoelasticity. Thermoelasticity, hyperelasticity, hypoelasticity, and electroelasticity may also be addressed.		3	E
AER/ME	644	Advanced Dynamics I	Many physical systems in engineering involve rigid bodies in translation and rotation. Such motions are studied in this course by the use of Euler's Laws. The kinematical description of the motions utilize the concept of reference frames. The inertia properties of rigid bodies, and the energy functions for rigid bodies are covered. Analytical and numerical solutions of dynamical systems of engineering interest are considered.		3	E
AER/ME	645	Advanced Control System Analysis	Conceptual development and study of complex systems; their synthesis and design; analysis and optimization of system parameters. Inputoutput relationships; formulation of mathematical models, parameters and constraints on physical systems.		3	E
AER/ME	647	System Optimization I	Introduction to linear and nonlinear optimization and their use in engineering design. Emphasis on numerical approaches and use ofoptimization methods for engineering systems (e.g. biological, mechanical, structural).		3	E
AER	674	Robust Control	This course presents methods for analyzing and controlling linear time-invariant (LTI) dynamic systems with model uncertainty. This course focuses on single-input single-output (SISO) systems and frequency-domain techniques. The major topics include: basic frequency-domain design techniques, fundamental limitations to performance for SISO systems, uncertainty modeling and robustness, the robust stabilization control problem, and the robust performance control problem.		3	N
AER	676	Robot Modeling and Control	This course teaches students about what it takes to make robots move the way we want them to move. There are three parts to the course. The first part discusses how to represent robot position and motion mathematically. The second part focuses on planning motions. The third part focuses on controlling the robot to achieve motion. In some cases, the planning and control are tied together. Throughout the course, students will use simulations to apply the concepts they are learning.		3	N
AER/ME	687	Nonlinear Systems and Control	This course presents methods for analyzing and controlling nonlinear dynamic systems. The major topics are: 1) fundamental properties of nonlinear ordinary differential equations such as existence and uniqueness; 2) Lyapunov stability theory; and 3) nonlinear feedback control techniques such as backstepping, feedback linearization, and Lyapunov-based design.		3	E
AER/ME	691	CFD I - Incompressible Flows	This course will cover a control-volume CFD approach for the conservation of momentum, heat and mass transfer. The emphasis will be on the discretization of the transport equations in general coordinates and its application in both structured and unstructured grid arrangements. Modern numerical schemes and pressure solution algorithms will also be covered. An introduction of turbulence modeling will be provided. At the end of the lecture, the students not only are able to understand the basics of commercial software but also will be able to write a general coordinate code for fluid flow, heat and mass transfer applications.		3	E
AER/ME	692	CFD II - Compressible Flows	This second course shall focus on the solution of the compressible Navier-Stokes equations. The Van-Leer's and Roe's approaches will be discussed to derive the discretization equations. Modern shock capturing schemes, such as FCT, TVD and ENO will be introduced. The solution techniques such as ADI, DDADI and line-relaxation will be used to solve the system of equations. Multi-grid acceleration techniques will be introduced to speed up the rate of convergence. Finally, the parallelization of CFD codes using shared and distributed computers will be discussed.		3	E
AER	699	Topics in Aerospace Engineering (Subtitle required)	A detailed investigation of a topic of current significance in aerospace engineering. May be repeated under different subtitles to a maximum of nine credits. A particular topic may be offered at most twice under the AER 699 number.		3	N
AER	749	Dissertation Research	Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters.		0	N
AER	769	Residence Credit for Doctor's Degree	Residence credit for PhD students. May be repeated indefinitely.		0-12	N
AER	780	Special Problems in Aerospace Engineering	This course consists of individual work in one aspect of aerospace engineering. May be repeated three times for a maximum of 9 credits.		3	N
AER	790	Research in Aerospace Engineering	Work may be taken in any field of aerospace engineering, subject to the approval of the director of graduate studies. May be used to satisfy pre-qualifying examination residency credit. May be repeated to a maximum of 18 hours.		1-9	N

# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table					36	NA
FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)			Note: number recorded will		0	NA

Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)	4	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	0	NA
	Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	36	NA
	Free Elective Hours (i.e., general program electives) (if applicable)	0	NA
	Total # of credit hours required for Program	40	NA
Information to be completed by PIE Office			
	# of new courses	14	NA
	Total # of Courses (includes new and existing)	37	NA
	Precentage of new courses (more than 25% may require SACS Substantive Change)	38%	NA

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14.0201-Aerospace, Aeronautical, and Astronautical/Space E
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Full Proposal - Basic Info

Institution :	University of Kentucky
Program Type :	Single Institution
Program Name :	Aerospace Engineering
Degree Level :	Doctor's Degree Research/Scholarship
Degree Designation :	DOCTOR OF PHILOSOPHY
CIP Code (2-Digit) :	14-ENGINEERING.
CIP Code :	14.0201-Aerospace, Aeronautical, and Astronautical/Space E
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	5/4/2021

Institutional Contact Information

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University of Kentucky
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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The Aerospace Engineering (AER) PhD program provides advanced programs of study and research opportunities in the modern engineering theory, technology, and practice associated with design, development, testing, and production of aircraft, spacecraft, and related aerospace systems. The program is designed to prepare its students for aerospace research and development in industry, government, and academia. The program offers a comprehensive aerospace engineering curriculum, similar to those at the top aerospace programs in the US, with instructors and advisors who are recognized researchers in the aerospace community.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

As Kentucky's flagship institution of higher education, UK's mission includes expanding educational opportunities to address current challenges and opportunities. Aerospace engineering is a growing occupation and an essential discipline for maintaining and advancing aircraft and spacecraft technologies. The proposed AER PhD program will open new opportunities for students who wish to pursue professional careers as aerospace engineers.

The University of Kentucky's mission also includes promoting economic development and improving people's lives through excellence in education and research. The proposed aerospace program supports UK's mission by increasing scientific discovery and innovation in aerospace, and by supporting the local aerospace industry with a highly-skilled workforce.

The proposed aerospace program supports UK's strategic plan by expanding and enhancing an emerging area of strength in research (see 2015-2020 Strategic Plan, Graduate Education, Strategic 2). UK's mechanical engineering department currently has active research programs in several diverse aerospace fields, including aerothermodynamic modeling of heat shields for atmospheric entry, combustion in aircraft systems, flow control, flight testing and control of unmanned aerial vehicles, compressible aerodynamics, control of rotorcraft, small satellite control, inflatable structures for aerospace systems, spectral simulation in equilibrium and non-equilibrium airborne observation of re-entry, electric spacecraft propulsion, turbomachinery, and aircraft vortex flows. These research activities will be enhanced and expanded by a dedicated degree program.

4. Is there a specialized accrediting agency related to this program?

No

4a. If yes, identify accreditor:

4b. Will accreditation be sought?

No

5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

NA

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6. Describe the rationale and need for the program to include how the institution determined need.

The Aerospace Engineering (AER) PhD program provides advanced study and research opportunities in modern engineering theory, technology, and practice associated with design, development, testing, and production of aircraft, spacecraft, and related aerospace systems. The program is designed to prepare its students for aerospace research and development in industry, government, and academia. The program offers a comprehensive aerospace engineering curriculum, similar to those at the top aerospace programs in the US, with instructors and advisors who are recognized researchers in the aerospace community.

The program is motivated by an increasing aerospace industry within Kentucky, increasing demand from students for a structured Aerospace program at UK, and the existence of sufficient faculty expertise within the Mechanical Engineering Department at UK to offer such a program with minimal investment.

The program will be housed in the Mechanical Engineering department, which has developed faculty expertise in many aspects of Aerospace Engineering. At least 8 existing faculty have active research programs in Aerospace Engineering areas already, and numerous elective courses that have been developed in ME cover Aerospace Engineering topics and are regularly offered. There is sufficient critical mass of people, courses and research opportunities to offer the AER PhD degree with no significant additional investment. This proposal accompanies related proposals to develop both undergraduate BS and graduate MS programs in AER as well. The BS program will require additional faculty hiring, initially consisting of three faculty, and more as the program grows naturally. These faculty hired to support the BS program will also be teaching and conducting research in the graduate programs contributing to additional electives and research opportunities over time.

Currently, undergraduate students in Mechanical Engineering that wish to pursue graduate degrees in Aerospace Engineering must look for those opportunities at other universities, and this regularly occurs with approximately 5-10 students each year pursuing AE advanced degrees elsewhere following completion of their BS in ME at UK. The current enrollment in the Mechanical Engineering PhD program is approximately 65 students with approximately 10 graduates per year. At typical joint Mechanical and Aerospace Engineering departments in other states about 1/3 of the total department students are in the Aerospace Program, thus we expect a steady enrollment of approximately 25 students, with annual PhD graduates of about 5 students. These are consistent with the demand we see just from our own BS graduates. While this is a modest number of students, we note that the existing expertise of Mechanical Engineering faculty in Aerospace fields permits this program to be launched with no required hires. The companion proposal to start a BS program in Aerospace Engineering will support hiring of several additional faculty. Thus, while the PhD program can start without the BS program, the BS program will expand aerospace expertise and permit additional courses to be added to the curriculum over time. Moreover, those faculty will support additional PhD students that will contribute to growth in this program.

There is clear demand from students, and capacity to offer the program with no significant additional resources and no major impact on existing programs in the department. The anticipated rates of PhD graduates matches well with current regional and state demand not accounting for the projected 14% growth in this area over the coming decade.

The proposed aerospace engineering doctoral program is intended for full-time graduate students. The degree requires a minimum of 36 semester hours of coursework (18 for students with an earned Master's degree in a related field), along with at least one year of residency following completion of an oral qualification exam, and completion of a research-based dissertation.

The University of Kentucky’s mission includes promoting economic development and improving people’s lives through excellence in education and research. The proposed aerospace program supports UK’s mission by increasing scientific discovery and innovation in aerospace, and by supporting the local aerospace industry with a highly-skilled workforce.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The objectives of this program are to prepare students to:
1. Pursue successful professional aerospace-engineering careers academia, industry, and government research labs
2. Become leaders in industry, academia, and public service be productive citizens with high professional and ethical standards
3. Use their engineering skills to make a positive impact in their community
4. Engage in continued professional development and life-long learning

2. Describe how the student learning outcomes for the program will be assessed.

The student learning outcomes for the proposed AE PhD program are:

(SO1) A mastery of the fundamental principles of aerospace engineering and in-depth knowledge of the state of the art in student's chosen field
(SO2) The ability to identify, investigate, formulate, and solve new problems through scholarly research
(SO3) The ability to communicate technical concepts both orally and in writing
(SO4) Understanding of professional and ethical responsibilities

3. Highlight any distinctive qualities of this proposed program.

The proposed AER PhD program would be the only comprehensive aerospace engineering program in the state. Current UK faculty members who will support the AER program have degrees from, or have previously held appointments at: University of Michigan Department of Aerospace Engineering; Ohio State University Department of Aeronautical and Astronautical Engineering; Princeton University Department of Mechanical and Aerospace Engineering; UC Davis Department of Mechanical and Aerospace Engineering; Universität Stuttgart College of Aerospace Engineering; and ETSI Aeronauticos Universidad Politecnica de Madrid. In addition, these faculty members have non-academic experience from: NASA; Air Force Research Laboratory, The Aerospace Corporation, McDonnell Douglas Astronautics Co. (now Boeing); Harris Corporation's Government Aerospace Systems Division; and Pratt & Whitney. The ME faculty has active research programs in diverse range of aerospace fields: aerothermodynamic modeling of heat shields for atmospheric entry; combustion in aircraft systems; flow control; flight testing and control of unmanned aerial vehicles; compressible aerodynamics; control of rotorcraft; satellite guidance and control; inflatable structures for aerospace systems; spectral simulation in equilibrium and non-equilibrium airborne observation of re-entry; electric spacecraft propulsion; turbomachinery; and aircraft vortex flows. This diverse experience and research activity will be leveraged to provide students a state-of-the-art education in aerospace engineering.

In addition, UK is the host institution for the NASA Kentucky Space Grant Consortium and EPSCoR programs, which are aimed at promoting aerospace-related scientific and technological innovation. NASA KY provides many unique opportunities for UK undergraduate students to collaborate with NASA researchers on aerospace research projects.

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4. Describe the admissions and graduation requirements for the program.

Admission, retention, and completion standards for the proposed AER program conform to policies of the Graduate School.

Admission Standards:
Applicants seeking admission to the AE graduate program must have an awarded baccalaureate degree. Admission to the AER graduate programs normally requires a Bachelor's degree in engineering (not necessarily in Aerospace Engineering) and a grade point average (GPA) of 3.0/4.0 or 70% on all graduate and undergraduate work, as well as Graduate Record Examination (GRE) scores of at least 300 (new scoring system) for the combined Quantitative and Verbal sections (with at least 160 on the quantitative section) and 3.5 for the Analytical section. An undergraduate degree in Mathematics, Chemistry or Physics combined with a strong interest in engineering topics may be suitable preparation when certain required undergraduate courses are taken. Exceptions to these requirements may be made by the Director of Graduate Studies if other persuasive evidence of the student's potential for success is available. All international students, except those with a degree from a U.S. institution, must have a minimum score of 550 (paper), 213 (computer), or 79 (Internet) on the Test of English as a Foreign Language (TOEFL), or an IELTS score of 6.5.

Retention Standards:
Students will be placed on scholastic probation if they have completed 12 or more semester hours of graduate coursework with a cumulative GPA of less than 3.0. Students will have one full-term semester, or the equivalent (9 hours), to remove the scholastic probation by attaining a 3.0 cumulative GPA. If probation is not removed after one semester, or 9 credit hours, the student will be dismissed from the Graduate School. Progress of each graduate student will be reviewed by the DGS, in consultation with the Graduate Studies Committee and the student's academic advisor, once each academic year, or more often for students on scholastic probation. If a student does not make satisfactory progress in coursework and/or research, that student shall be dismissed from the graduate program.
The Aerospace Engineering Graduate program will assess the progress of PhD students. Each academic year students will submit an Assessment form, CV, Plan of Study, and 2-4 page summary of progress to their advisor/advisory committee. The advisor/advisory committee will attach their comments on each PhD student and submit to the DGS. After three consecutive unsatisfactory assessments, that student will be dismissed from the AER Graduate program.
Completion Standards:
Students have 6 years to complete all degree requirements. Extensions up to an additional 4 years may be granted. Extensions up to 2 years may be approved by the Dean of the Graduate School or designate. Requests for extensions longer than 2 years must be considered by the Graduate Council. Students must complete all graduate coursework with a cumulative standing of not less than 3.0 on a 4.0 scale, and there must be no outstanding incomplete grades.
PhD students are required to take and pass the PhD Written Qualification Examination which constitutes the written portion of the Qualifying Examination required by the Graduate School. This written exam tests knowledge in specific required undergraduate topic areas, but exams will be sufficiently difficult to test mastery of these concepts. Students have up to 2 seatings during which they must pass one written exam in mathematics and two additional exams in other topic areas. No student will be permitted to take exams in more than 2 seatings. Failure to pass the math exam and two additional exams by the end of the student's second seating will result in the student's dismissal from the AER doctoral program. Failure to complete the Written Qualification Exam within the specified time limit will result in the student's dismissal from the AER doctoral program.

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5. Describe the administrative oversight to ensure the quality of the program.

The PhD Aerospace program will be housed in the Mechanical Engineering Department, which currently has 39 faculty and oversees 1 undergraduate and 3 graduate programs. One of our faculty will be appointed as the Director of Graduate Studies (DGS) for the new PhD Aerospace Program (a 15% administrative appointment) and will oversee course planning, student and program assessment, student advising, and any future curricular changes. This DGS will be the same as for the companion MS program. The DGS will report to the Department Chair and will coordinate with the DGS for the ME program where resources and classes are shared. The Aerospace DGS will also chair a graduate studies committee consisting of at least 5 faculty that teach aerospace engineering graduate courses. This committee will review program assessment and will be the committee to primarily review any required student exceptions and any proposed changes to course syllabi or program structure. This committee will also oversee the qualification exam process for the AER doctoral program. Any changes recommended by this committee will then be approved by vote of the full department faculty. This structure mirrors our administration of the PhD ME program. While the DGS for Aerospace will be distinct from the DGS for ME, other department resources including staff for budgeting, purchasing, faculty affairs, scheduling, etc. will be shared with ME. We presently have 11 staff in the department.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Not applicable

7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	40	4	36	

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

Currently, undergraduate students in Mechanical Engineering that wish to pursue graduate degrees in Aerospace Engineering must look for those opportunities at other universities, and this regularly occurs with approximately 5-10 students each year pursuing AE advanced degrees elsewhere following completion of their BS in ME at UK. The current enrollment in the Mechanical Engineering PhD program is approximately 65 students with approximately 10 graduates per year. At typical joint Mechanical and Aerospace Engineering departments in other states about 1/3 of the total department students are in the Aerospace Program, thus we expect a steady enrollment of approximately 25 students, with annual PhD graduates of about 5 students. These are consistent with the demand we see just from our own BS graduates. While this is a modest number of students, we note that the existing expertise of Mechanical Engineering faculty in Aerospace fields permits this program to be launched with no required hires. The companion proposal to start a BS program in Aerospace Engineering will support hiring of several additional faculty. Thus, while the PhD program can start without the BS program, the BS program will expand aerospace expertise and permit additional courses to be added to the curriculum over time. Moreover, those faculty will support additional PhD students that will contribute to growth in this program.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	5
2022-23	0	10
2023-24	5	15
2024-25	10	20
2025-26	15	25

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Aerospace Engineering (industry)	112480	4	14.0	0	0	14.0	84685	845	6.0
Aerospace Engineering (University)	71091	11	14.0	98650	2	14.0	75489	165	6.0

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2b. Clearly describe evidence of employer demand.

Aerospace engineers are employed to design or build aircraft, spacecraft, satellites, missiles, and supporting aerospace systems. Aerospace engineers are employed by industry, academia, and government labs for manufacturing, analysis and design, and research and development.

At the state level, Kentucky is home to 79 aerospace-related facilities, which employ over 19,000 people. Aerospace is the top export in the state, and Kentucky is third leading aerospace exporter in the US, behind California and Washington. In 2019, Kentucky exported more than $14.6 billion in aerospace products and parts, a 16.4% increase from the previous year. The aerospace industry in Kentucky consists of many prestigious companies, including General Electric, Lockheed Martin, Belcan Corp., Raytheon, General Dynamics Group, and Sikorsky Aircraft Corp. Kentucky's Cabinet for Economic Development Kentucky has indicated that aerospace is a primary focus for job creation and retention. Since 2014, Kentucky has announced 62 aerospace-related projects, totaling more than $2.7 billion in investment and the announcement of nearly 4,000 jobs.

At the regional level, the Southeast United States has some of the world's most advanced aviation manufacturing companies, industry suppliers, and research and development institutions. Moreover, the Southeast region is home to 5 NASA centers and facilities. A 2015 national workforce study by Aviation Week Network found that the highest percentage job growth for the aerospace industry is in the Southeast region.

At the national level, aerospace is one of the healthiest industrial segments of the US economy. The US accounts for approximately half of the world's global aerospace production. Aerospace & Defense is the largest US deficit reducing industry, effectively cutting the federal trade deficit by 10% ("2019 Facts & Figures: U.S. Aerospace & Defense", Aerospace Industries Association). Employment of aerospace engineers in the US is projected to grow 6% from 2018 to 2028, according to the US Bureau of Labor Statistics. There are also many emerging aerospace employment opportunities. The unmanned aerial vehicle (UAV) market is projected to grow at a rate of 10% from 2016 to 2024. Investment in space companies (e.g., SpaceX, OneWeb, and Telesat) reached a record high in 2018; and Morgan Stanley projects that the global space industry could generate revenue of more than $1 trillion by 2040, up from $350 billion currently.

In 2019, two Southeast region schools were among the top 5 US universities in supporting the aerospace &defense workforce. Specifically, Georgia Tech and Central Florida were among the top 5 universities for preferred suppliers of aerospace engineers, and Central Florida currently leads the nation in supplying graduates for aerospace & defense.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

Not Applicable

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

Not Applicable

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4b - How will the program support or be supported by other programs within the institution?

The proposed AER PhD program will be integrated into the Mechanical Engineering (ME) Department, which may be renamed the Mechanical and Aerospace Engineering Department (or similar). Course offerings include cross-listings with ME, Manufacturing Systems Engineering (MFS), and Materials Science and Engineering (MSE). All AER, AER/ME, and AER/ME/MFS courses will be instructed by ME faculty. All AER/MSE courses will be instructed by MSE or ME faculty. Current ME faculty who will instruct AER courses have AER degrees or significant research experience in an AER discipline. Each new faculty hire who will instruct AER courses will have an AER degree and extensive research experience in an AER discipline.

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Internal					
Allocation :	0	0	0	0	0
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Student Tuition					
New :	27076	54152	81228	108304	135380
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Student tuition is projected based on current in-state tuition rates ($13,538) and projected enrollment (5/10/15/20/25) multiplied by 40% for net tuition return to college				
Total					
New :	$27,076	$54,152	$81,228	$108,304	$135,380
Existing :	$0	$0	$0	$0	$0
Total Funding Sources :	$27,076	$54,152	$81,228	$108,304	$135,380

B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Other Professional					
New :	0	0	0	0	0
Existing :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Faculty					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Equipment and Instructional Materials					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total					
New :	$0	$0	$0	$0	$0
Existing :	$0	$0	$0	$0	$0
Total Budget Expenses/Requirements :	$0	$0	$0	$0	$0
Grand Total					
Total Net Cost :	$27,076	$54,152	$81,228	$108,304	$135,380

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

Post-graduate success will be evaluated using an alumni survey. Each year a detailed survey will be completed by program alumni from 1 and 5 years after graduation. The questions request information on their experiences since graduation and perspectives on the AER PhD program. Some of the questions are associated with the student outcomes. For each question, the alumni are asked to evaluate the importance of the topic, as well as their level of preparation by the program.

PROPOSED PROGRAM SUMMARY

Instituion: University of Kentucky
Program Name: Biostatistics
Degree Designation: MASTER OF SCIENCE (MS)
Degree Level : Master's

Program Description

This two-year degree in Biostatistics aims to train students in methodological skills foundational to biostatistics. The program will meet the needs of individuals who seek to work in the healthcare, government health agencies, biomedical research, or pharmaceutical industry. Jobs in these fields require advanced knowledge for the analysis of health science data. Students will benefit from experiential learning opportunities and formal training in the application of descriptive and inferential statistics specific to biomedical research, clinical and translational studies, and public health and improving the health of populations. Twenty-one course hours will come from core biostatistics courses, including three credit hour capstone course in which students will have the opportunity to learn consulting practices through experiential learning. The remaining twelve hours will be electives, with some electives from epidemiology. The program will only offer a non-thesis option (Plan B) requiring 33 hours of graduate-level coursework. The thesis option (Plan A) will not be offered.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify

No

CIP Code: 26.1102
Credit Hours: 33
Institutional Board Approval Date: 6/16/2021
Implementation Date: 8/16/2021

Student Demand

Year 1 - 5
Year 2 - 10
Year 3 - 15
Year 4 - 20
Year 5 - 25

Market Demand

The following statement was borrowed from the University of Florida’s Department of Biostatistics (One of the Benchmark Institutions identified by CPE) webpage:

The demand for trained biostatisticians continues to increase as the world becomes more dependent on predictive data and numerical reasoning, particularly related to

research in the health sciences.

On March 21, 2016, the Fortune magazine ranked the Master in Biostatistics #1 in the list of Best Graduate Degrees for Jobs in 2016 based on long-term outlook for job growth, median salaries and job satisfaction scores. The master degree in Biostatistics has a 23% projected growth in jobs by 2024; and 85% of degree-holders said they were “highly satisfied” in one of PayScale’s surveys. This ranking is up from #2 in this same list in 2015 which stated:

“Those who earn a graduate degree in biostatistics, work in healthcare, biotech, and life sciences, using computer models to, for example, predict cancer growth in a cell. The degree still isn’t offered by many schools but is gaining traction.”

Also, according to the U.S. Bureau of Labor Statistics, improvements in statistical and mapping software will improve analysis, make epidemiological data more useful, and enhance health educators’ and community health workers’ ability to identify healthy habits and behaviors and good health care services that will improve health outcomes and reduce healthcare costs.

Employment Demand

		Regional	State	National
Type Of Job	**Biostatistician**			
Avg. Wage		$75,233	$92,838	$80,009
# Jobs (Postings)		69	28	6615
Expected Growth		0%	36%	37%
Type Of Job	**Statistician**			
Avg. Wage		$73,598	$74,126	$77,910
# Jobs (Postings)		56	20	4623
Expected Growth		0%	36%	37%

Indicate source of market demand information

Data was gathered from Burning Glass and utilizes BLS data, actual job postings over the last 12 months, and Burning Glass proprietary data models. Projections are for 2019-2028

Academic Demand

NA

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
4430	00199900	University of Louisville	MS	Biostatistics	2015

Comparison of Objectives/Focus/Curriculum to Similar Programs:
The proposed program is an in-person program whereas the University of Louisville's program is fully online. The curriculum for the program at the University of Louisville does not include consulting courses. The curriculum for the proposed MS requires two courses on consulting. Further Louisville's program requires a thesis as a graduation requirement and the proposed program does not.

Comparison of Student Populations:
The proposed program is face-to-face while the other program is completely online.

Access to Existing Programs:
The target population for the two degrees is different. The degree program at Louisville is fully online. The proposed MS in Biostatistics will not be a distance learning program and will offer the opportunity for in person experiential learning with biostatistical consulting embedded.

Feedback from Other Institutions:
Faculty at UofL have been contacted and have not raised any initial concerns

Cost

Projected Revenue over Next Five Years ($) : 3571005
Projected Expenses over Next Five Years ($) : 441125

Will Additional faculty be needed? No

Provide a budgetary rationale for creating this new program
The costs of implementing and running the MS in Biostatistics can be amply met with new funds generated by the program tuition income. The operational and management resources for the program will be provided by the Department of Biostatistics. The only physical resources needed is the classroom space. Majority of the courses required for the proposed MS in Biostatistics are already implemented. One of the benefits of the proposed program is that it will drive demand for current offerings and the enrollments for these courses will increase. As such the required physical resources for the program are low.

Course Title (CIP)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
BST	635	Databases and SAS Programming	BST 635 covers basic concepts on databases with applications to public health. Students will learn how to program in SAS, the leading statistical analysis system. SAS skills include managing data, using SQL, generating descriptive statistics, visualizing data, writing reports, writing MACROs, and programming using SAS.	C	3	E
BST	675	Simulation Based Inference fo Health Data Science	BST 675 covers the fundamentals of probability and inference through simulation. Topics are focused on methodology used in health data science and include, but are not limited to, random variables, independence, discrete and continuous distributions, confidence intervals, hypothesis testing, and efficient estimators. Prereq: BST 600 or equivalent.	C	3	E
BST	681	Linear Regression	BST 681, the first in a two-semester sequence in regression modeling, covers linear regression models for normally distributed outcomes. The course will cover simple and multiple linear regression, estimation, interpretation, hypothesis testing, model building and diagnostics, matrix algebra for regression, and an introduction to design of experiments. The course will include the use of computing tools to apply these models to real data. Prereq: BST 600 or consent of instructor and 1 semester of calculus.	C	3	E
BST	682	Generalized Linear Models	This course, the second in a two-semester sequence in regression modeling, covers regression models for outcomes which are not normally distributed, such as binary and count data. The course will cover the generalized linear model framework, multivariate maximum likelihood theory, logistic regression, Poisson regression, and nominal and ordinal logistic regression models, as well as approaches for building models and checking assumptions. The course will include the use of computing tools to apply these models to real data. Prereq: BST 675, BST 681.	C	3	E
BST	693	Statistical Practice in Public Health	To provide an introduction to statistical practice in public health including improved statistical communication (how to ask good questions in a consulting session, writing analysis plans, and how to express results both orally and in writing), programming for reproducibility and data ethics, and utilizing statistical methodology for problem solving in public health research. Prereq: BST 600 or equivalent and BST 635.	C	3	E
CPH	712	Advanced Epidemiology	This course provides students with the understanding of advanced issues in the design, analysis, and interpretation of epidemiologic studies. The course text and associated readings will focus on study designs and the methodologic approaches to addressing bias, confounding, and error in the design of population-based health research. The development of a systematic approach for evaluating evidence from epidemiologic studies as it relates to demonstrating causality will be emphasized. Focusing on study design, measures of associations, confounding, interaction, sources of bias and error, the student will gain an understanding of epidemiology and its role in the medical and public health sciences. Prereq: Enrollment in a public health degree program and CPH 605 or consent of instructor.	C	3	E
BST	699	Advanced Biostatistics Practice	BST 699 is a required course for students enrolled in the Biostatistics MS program in their final spring semester. This course will require students to complete a culminating project which draws from elements of the core curriculum and further develops both technical and non-technical skills using project-based learning.	C	3	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) Note: number recorded will		21	NA

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable) Note: number recorded will		0	NA

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
BST	535	Introduction to R Programming	BST 535 course provides an introduction to R programming with an emphasis on exploration, manipulation, and visualization of data sets. Students will learn application of statistical techniques in R, statistical programming, and practice effective communication of one's findings.	P	3	N
BST	631	Design and Analysis of Health Surveys	BST 631 covers design and analysis issues associated with well-known national health surveys, including reliability and validity of measurements, instrument validation, sampling designs, weighting of responses, and multiple imputations. Students will learn how to use statistical software to analyze data from complex survey designs. Prereq: BST 600 STA 580 or equivalent.	P	3	E
BST	636	Analytic Methods for Mining Healthcare Data	BST 636 covers statistical techniques for issues associated with the exploration of large public health data sets and the development of models from such data sets. The practical issues involved in analyzing large observational healthcare data will be addressed with a focus on appropriate interpretations and the effective communication of results. Prereq: BST 600 and BST 635 or consent of instructor.	P	3	E
BST	655	Introduction to Statistical Genetics	BST 655 presents an introduction to the statistical methodologies used today to investigate genetic susceptibility to complex diseases. The course focuses on linkage and association analysis with applications to real-world data. Commonly used (and freely available) software will be presented and used throughout. Because the field is constantly evolving, a focus of the material for this course will be recent statistical human genetics literature. Prereq: BST 600, CPH 603 or consent of instructor.	P	3	E
BST	661	Survival Analysis	BST 661 provides an introduction to common concepts and methods used in the display and analysis of time to event data. Topics include censoring, hazard rates, estimation of survival curves, regression techniques, applications to human health studies. Prereq: BST 600.	P	3	E
BST	662	Applied Longitudinal Analysis	BST 662 presents applied statistical techniques for analyzing data from longitudinal studies and repeated measures experiments that occur frequently in public health, clinical and translational trials, and health outcomes research. This course will cover linear mixed models, generalized linear mixed models and generalized estimating equations as they apply to the analysis of correlated data. Prereq: BST 600.	P	3	E
BST	663	Analysis of Categorical Data	BST 663 is an applied first course in the analysis of categorical data. Topics for categorical data include methods for proportions, rates, ratios, relative risks, risk ratios, and odds ratios. Cochran-Mantel-Haenzel tests, exact tests, logistic regression, time to events and life table methods, and generalized least square methods will be discussed with applications in public health, clinical and translational trials. Prereq: BST 600, CPH 603, or instructor consent.	P	3	E

BST	664	Design and Analysis of Clinical Trials	BST 664 covers the fundamental concepts used in the design of Phase clinical and translational trials with an introduction to statistical methodology associated with trial data analysis. Prereq: BST 600 or consent of instructor.	P	3	E
BST	676	Theory for Biostatistics Methods	BST 676 covers the theoretical underpinnings of probability and inference as it relates to methodology in public health. Topics include, but are not limited to, random variables, independence, discrete and continuous distributions, confidence intervals, hypothesis testing, and efficient estimators. Prereq: BST 675.	P	3	E
BST	698	Bayesian Modeling in Biostatistics	BST 698 provides an introduction to Bayesian approaches and data analysis with application to public health, clinical trial and translational science. The course illustrates current approaches to Bayesian modeling and computation in biostatistics. Prereq: BST 682 and BST 675 or equivalent.	P	3	E
EPI	717	Introduction to Causal Inference	Epidemiology can be defined as the study of the distribution and determinants of health and disease in human populations. As a result, most epidemiological studies are observational designs that are subject many biases. In this course, we will focus on the mitigation of confounding and selection bias through the application of causal inference methodologies. Prereq: CPH 712.	P	3	E
			Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table		12	NA

FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)			Note: number recorded will		0	NA

Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)	21	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	0	NA
	Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	12	NA
	Free Elective Hours (i.e., general program electives) (if applicable)	0	NA
	Total # of credit hours required for Program	33	NA
Information to be completed by PIE Office			
	# of new courses		NA
	Total # of Courses (includes new and existing)		NA
	Precentage of new courses (more than 25% may require SACS Substantive Change)	#VALUE!	NA

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Full Proposal - Basic Info

Institution :	University of Kentucky
Program Type :	Single Institution
Program Name :	Biostatistics
Degree Level :	Master's
Degree Designation :	MASTER OF SCIENCE
CIP Code (2-Digit) :	26-BIOLOGICAL AND BIOMEDICAL SCIENCES.
CIP Code :	26.1102-Biostatistics.
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	4/4/2021

Institutional Contact Information

First Name :	Annie
Last Name :	Weber
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Full Proposal - Overview

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1. Provide a brief description of the program with its estimated date of implementation.

This two-year degree in Biostatistics aims to train students in methodological skills foundational to biostatistics with an estimated implementation date of Fall 2021. The program will meet the needs of individuals who seek to work in the healthcare, government health agencies, biomedical research, or pharmaceutical industry. Jobs in these fields require advanced knowledge for the analysis of health science data. Students will benefit from experiential learning opportunities and formal training in the application of descriptive and inferential statistics specific to biomedical research, clinical and translational studies, and public health and improving the health of populations. Twenty-one course hours will come from core biostatistics courses, including three credit hour capstone course in which students will have the opportunity to learn consulting practices through experiential learning. The remaining twelve hours will be electives, with some electives from epidemiology. The program will only offer a non-thesis option (Plan B) requiring 33 hours of graduate-level coursework. The thesis option (Plan A) will not be offered.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

The University of Kentucky is a public, land grant university dedicated to improving people's lives through excellence in education, research and creative work, service, and health care. The proposed MS in Biostatistics program supports UK's mission in that it:
1. Facilitates learning, informed by scholarship and research;
2. Expands knowledge through research, scholarship, and creative activity; and
3. Serves a global community by disseminating, sharing, and applying knowledge using a data- and information rich approach.
It directly supports and implements UK's strategy in (1) Graduate Education and in (2) Research and Scholarship.

4. Is there a specialized accrediting agency related to this program?

No

4a. If yes, identify accreditor:

4b. Will accreditation be sought?

No

5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

6. Describe the rationale and need for the program to include how the institution determined need.

The university recognizes the unique nature of and need for Biostatistics and has a department of Biostatistics located in the College of Public Health. Currently the university lacks a program which trains students in methodological skills specific to biostatistics. The proposed program will fill this gap by meeting the needs of individuals who seek to gain the skills specific to biostatistics and work in the healthcare, government health agencies, biomedical research, or pharmaceutical industry. Jobs in these fields require advanced knowledge for the analysis of health science data.

As further evidence of need, of the eleven Benchmark Institutions identified by CPE nine offer MS degrees in Biostatistics. The addition of the MS in Biostatistics furthers the Universities aim to meet the goals and performance as set by Benchmark institutions.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The goal of this program is to provide students with advanced training in Biostatistics needed to support continued regional and national workforce demands. The program aims to prepare students through quality lecture and experiential learning to apply descriptive and inferential biostatistical skills in a public health setting. Specific program objectives, reflecting expectations for our students in the years following graduation, are that graduates of our program will:
1.Obtain employment and advance in careers appropriate to an advanced Biostatistics degree.
2.Be leaders in the public health sector, biomedical research and development, or be pursuing further graduate study.
3.Use the methodological skills developed in the program to make a positive impact on improving the health of populations both locally and worldwide.
4.Engage in continued professional development and life-long learning.

2. Describe how the student learning outcomes for the program will be assessed.

1. Demonstrate the ability to construct written or oral communication which interprets the results and interpretations of a statistical analysis in an easily comprehendible manner to a collaborating health scientist.
2. Develop a statistical analysis plan to address a research question using biostatistical theory and applications while remaining aware of the limitations.
3. Apply concepts from the intersection between biostatistics and epidemiological as it applies to the analysis of data.
4. Develop code for statistical software to manipulate and analyze data sets using appropriate biostatistical methods.

3. Highlight any distinctive qualities of this proposed program.

A distinctive quality of the proposed MS in Biostatics is the training students will receive for biostatistics consulting. The theory and practice of consulting in biomedical science environments surpasses classroom training in application and is a hallmark of the experiential learning in the proposed MS in Biostatistics program. The departments partnership with collaborators such as the Center for Clinical and Translational Science (CCTS) well equips the department to offer this unique opportunity to students.

4. Describe the admissions and graduation requirements for the program.

Admissions: Undergraduate GPA of 2.75. Successful applicants will have a moderate mathematics background, requiring at least two semesters of Calculus and a basic statistics course.
Retention: Each student enrolled in the program will have an advising committee consisting of faculty members with expertise and resources related to biostatistics. Each student will work on a well-motivated, engaging project involving the analysis, interpretation, and application of real-world data analysis
Completion: Students are to maintain a GPA of 3.0 in all core and elective courses. Students are required to provide a culminating project and complete an oral project defense before their faculty committee established according to Graduate School policies (as part of the required Advanced Biostatistics Practice course. Committee members examine the technical competency of students at the oral defense, which acts as the program final exam.

5. Describe the administrative oversight to ensure the quality of the program.

The MS in Biostatistics will be housed in and administered by the Biostatistics department. The day-to-day operation of the program will be the responsibility of the Biostatistics Graduate committee consisting of 3-4 graduate faculty members and chaired by the Director of Graduate Studies for the program. The Biostatistics Graduate Committee will be responsible for the admissions process, student advising, and planning and assessment, which will focus on ensuring student success. The DGS and members of the Biostatistics Graduate Committee will be selected from members of the faculty of record.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Not Applicable.

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7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	33	21	12	

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

In addition to employer demand/job outlook there is also evidence of student demand. According to Burning Glass Technologies (https://www.burning-glass.com/) there has been a 20% increase in degrees conferred from 2015-2019. There has also been a 19% increase in the number of institutions offering a Master's degree in Biostatistics over that same time frame.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	5
2022-23	5	10
2023-24	10	15
2024-25	15	20
2025-26	20	25

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Biostatistician	75233	69	0.0	92838	28	36.0	80009	6615	37.0
Statistician	73598	56	0.0	74126	20	36.0	77910	4623	37.0

2b. Clearly describe evidence of employer demand.

The following statement was borrowed from the University of Florida's Department of Biostatistics (One of the Benchmark Institutions identified by CPE) webpage:

The demand for trained biostatisticians continues to increase as the world becomes more dependent on predictive data and numerical reasoning, particularly related to research in the health sciences.

On March 21, 2016, the Fortune magazine ranked the Master in Biostatistics #1 in the list of Best Graduate Degrees for Jobs in 2016 based on long-term outlook for job growth, median salaries and job satisfaction scores. The master degree in Biostatistics has a 23% projected growth in jobs by 2024; and 85% of degree-holders said they were "highly satisfied" in one of PayScale's surveys. This ranking is up from #2 in this same list in 2015 which stated:

"Those who earn a graduate degree in biostatistics, work in healthcare, biotech, and life sciences, using computer models to, for example, predict cancer growth in a cell. The degree still isn't offered by many schools but is gaining traction."

Also, according to the U.S. Bureau of Labor Statistics, improvements in statistical and mapping software will improve analysis, make epidemiological data more useful, and enhance health educators' and community health workers' ability to identify healthy habits and behaviors and good health care services that will improve health outcomes and reduce healthcare costs.

Of the eleven Benchmark Institutions identified by CPE nine offer MS degrees in Biostatistics.

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3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

Not applicable

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

The proposed program is an in-person program whereas the University of Louisville's program is fully online. The curriculum for the program at the University of Louisville does not include consulting courses. The curriculum for the proposed MS requires two courses on consulting. Further Louisville's program requires a thesis as a graduation requirement and the proposed program does not.

The target population for the two degrees is different. The proposed MS in Biostatistics will not be a distance learning program and will offer the opportunity for in person experiential learning with biostatistical consulting embedded.

Feedback was solicited from Dr. Gaskins from the University of Louisville. He supported the proposal and was very complimentary of the consulting aspect of the program.

4b - How will the program support or be supported by other programs within the institution?

There will be some course sharing between departments

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
University of Louisville	Biostatistics	54		41	8	25	6	12	3	11	5	12	5

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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Internal					
Allocation :	0	0	0	0	0
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Student Tuition					
New :	105222	380898	619882	827010	925692
Existing :	0	49682	156418	218914	287283
Narrative Explanation/Justification :	Expected students retention rate for 2 terms by tuition				
Total					
New :	$105,222	$380,898	$619,882	$827,010	$925,692
Existing :	$0	$49,682	$156,418	$218,914	$287,283
Total Funding Sources :	$105,222	$430,580	$776,300	$1,045,924	$1,212,975

B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	0	0	0	0	0
Existing :	3355	3355	3355	3355	3355
Other Professional					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Faculty					
New :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Existing :	35362	70725	106087	106087	106087
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Equipment and Instructional Materials					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Narrative Explanation/Justification :	None				
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	None				
Total					
New :	$0	$0	$0	$0	$0
Existing :	$38,717	$74,080	$109,442	$109,442	$109,442
Total Budget Expenses/Requirements :	$38,717	$74,080	$109,442	$109,442	$109,442
Grand Total					
Total Net Cost :	$66,505	$356,500	$666,858	$936,482	$1,103,533

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

We plan to conduct an alumni survey approximately one year after graduation date. An alumni questionnaire administered by SEAS office in the College of Public Health. Additionally, we will continually follow students' professional progress via social networks such as LinkedIn.

PROPOSED PROGRAM SUMMARY

Instituion: University of Kentucky
Program Name: Computer Engineering Technology
Degree Designation: BACHELOR OF SCIENCE (BS)
Degree Level : Baccalaureate

Program Description

The proposed Bachelor of Science (BS) in Computer Engineering Technology (CPT) degree offers students opportunities to acquire the knowledge, skills, and strengths to develop the engineering acumen for becoming technical leaders. It prepares students to succeed in the design, implementation, integration, and support of computer-based and network systems that are critical to the success of enterprises, projects, research and development, and technical goals. In this increasingly interconnected world, technical experts with the ability to understand, link, use and integrate computer hardware, software and networks, and who can evolve systems as needs change, are in high and ever-increasing demand.

The proposed four-year BS in CPT is designed as a feeder-completer program in which students earn an Associate in Applied Science (AAS) in CPT from the Bluegrass Community and Technical College (BCTC) and then a BS in CPT from the University of Kentucky (UK). In this arrangement, the UK will offer only Junior and Senior level coursework.

The proposed curriculum provides in-depth knowledge of hardware and software design, development, applications and maintenance. It is based on a solid academic foundation with intensive classroom and laboratory experiences. Students gain strong background knowledge and expertise in cutting-edge developments and applications, and programming languages currently used in industry. Students learn and experience industrial-standard approaches to developing application software as well as state-of-the-art problem-solving techniques for code and firmware development with networking and web operations. The hardware focus of the curriculum is in digital systems design and development. From low-level gate design to high-end microprocessors and current/advancing bus standards, students gain an architectural understanding of computer systems. The curriculum includes in-depth design and analyses of combinational logic, sequential logic and state machines, microcontroller systems, microprocessor systems, and state-of-the-art computer technology.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
No

CIP Code: 15.1201
Credit Hours: 127
Institutional Board Approval Date: 2/18/2021
Implementation Date: 8/16/2021

Student Demand

Year 1 - 10
Year 2 - 34
Year 3 - 86
Year 4 - 130
Year 5 - 145

Market Demand

The Kentucky Council on Postsecondary Education (KY CPE) recently published in April 2020 it's Engineering Sector Analysis in Kentucky. The report assesses and discusses labor market information along with program demand gap and migration analyses. It evaluates the effectiveness of Kentucky institutions in meeting workforce demand in the engineering sector. The KY CPE report identifies a large gap existing in the area of Engineering Technology, an area considered critical for meeting manufacturing job openings and in-state BS educational opportunities.

The KY-CPE findings are consistent with a national trend in which the skills shortages in manufacturing have been well documented. The following highlights a few examples.

In November 2017, McKinsey Global Institute published a report titled "Making it in America: Revitalizing US manufacturing." The report outlined how multiple technology advances are converging and changing manufacturing industries and driven by an explosion in the volume of available data, developments in?analytics?and machine learning, new forms of human-machine interactions, intelligent robots, interconnected supply chains, and an ability to transmit digital instructions to the physical world. These complementary technologies can run smart, cost-efficient, and automated plants that produce large volumes or highly customized products. Concomitantly, increased knowledge and technology skills are required on factory floors.

In a December 2019 article published in the Wall Street Journal, entitled "American Factories Demand White-Collar Education for Blue-Collar Work," the authors defined how new manufacturing jobs that require more advanced skills are driving the education level needed by factory workers. For the first time, manufacturers are on track to employ more college graduates than workers with a high-school degree or less education; this change, in part, coincides with manufacturing shifts toward automation that has increased factory output.

Deloitte and the Manufacturing Institute have been tracking skills shortages for the past 17 years. They have documented how skill shortages continue to swell and threaten to impede the current growth and productivity in the US manufacturing industry. In their November 14, 2018 report entitled "The jobs are here, but where are the people?", Deloitte and the Manufacturing Institute explored the depths of today's talent shortage in manufacturing and how jobs are changing due to technology and automation. They predicted a 53% shortage of skills in the US manufacturing industry by 2028.

In response to local, state and national skills needs, the proposed Program partners the UK with the BCTC and creates a unique, joint feeder-completer educational opportunity within Kentucky.

Employment Demand

	Regional	State	National
Type Of Job	**Computer Hardware Engineer**		
Avg. Wage	$88,815	$81,785	$99,862
# Jobs (Postings)	37	15	10895
Expected Growth	4%	0%	5%
Type Of Job	**Computer Programmers**		
Avg. Wage	$75,051	$71,861	$81,595
# Jobs (Postings)	757	372	67511
Expected Growth	0%	0%	0%
Type Of Job	**Computer Support Specialist**		
Avg. Wage	$47,023	$45,267	$52,457
# Jobs (Postings)	1747	1139	146267
Expected Growth	9%	16%	11%
Type Of Job	**Computer Systems Analyst**		
Avg. Wage	$78,426	$76,596	$85,291
# Jobs (Postings)	2829	1191	219915
Expected Growth	4%	11%	9%
Type Of Job	**Computer Systems Engineers/Architects**		
Avg. Wage	$101,376	$98,193	$103,258
# Jobs (Postings)	2154	1036	258333
Expected Growth	9%	11%	9%

Indicate source of market demand information

Burning Glass Technology. Job postings for the last 12 months and projections are from 2019-2028 and are based on Bureau of Labor Statistics projections

Academic Demand

NA

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
6508	00927500	Northern Kentucky University	BS		2015

Comparison of Objectives/Focus/Curriculum to Similar Programs:
This is a closed program

Comparison of Student Populations:
This is a closed program

Access to Existing Programs:
This is a closed program

Feedback from Other Institutions:
This is a closed program

Cost

Projected Revenue over Next Five Years ($) : 4383936
Projected Expenses over Next Five Years ($) : 3499292

Will Additional faculty be needed? Yes
The Engineering Technology Department will collaborate with the Institute of Research for Technology Development (IR4TD) and will share resources. IR4TD will make available $1.5 million. Besides, the Toyota Motor North America (TMNA) is donating $4.25 million to support the new Department; per the donor's requests, the TMNA funds are to be allocated as follows:

A $2 million endowment to create the Toyota Engineering Technology Diversity Scholarship

A $1 million endowment to create the Toyota Engineering Technology Distinguished Professorship

$1.25 million for Engineering Technology Laboratory Enhancement, faculty recruitment, and general expenses. This amount supports both the Computer Engineering Technology and Lean Systems Engineering Technology programs

Provide a budgetary rationale for creating this new program
The BS in CPT is expected to increase revenue by attracting a new pool of students to UK. It is also projected to increase retention rates and, therefore, generate tuition dollars.

Also, faculty in the CPT program will be engaged in activities with industry partners, through consulting services and applied research. These activities are estimated to generate income projected as follows: Yr2: $100K, increasing $25K yearly after that.

Course Title (CIP) BS Computer Engineering Technology (15.1201)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix BCTC Prefix used for BCTC courses	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
ENG	101	Writing I	A course in writing emphasizing argument. Instruction and practice in reading critically, thinking logically, responding to texts, developing research skills, writing substantial essays through systematic revision, addressing specific audiences, expressing ideas in standard and correct English. Includes grammar and mechanics review. Notes: (a) Credit not available by special examination; (b) ENG 101 and 102 may not be taken concurrently.	P	3	E
MAT	170	Elementary Calc & Its Applications	An introduction to differential and integral calculus, with applications to business and the biological and physical sciences.	P	3	E
CIT	111	Introduction to Software and Hardware	Provides a conceptual and practical view of client operating systems and the hardware systems required to run them. Covers computer hardware components, operating system interfaces and management tools, peripheral device management, computer security, and basic networking components. Includes hands-on experience with hardware and software, and exposure to multiple operating systems.	P	4	E
UK Core	Any Social and Behavioral Science Course	Social and Behavioral Science Course	Social and Behavioral Science Course	P	3	E
CIT	120	Computational Thinking	Promotes understanding of computer programming and logic by teaching students to "think like a computer". Covers skills needed to develop and design language-independent solutions to solve computer-related problems. Covers development and design basics including use of variables, control and data structures, and principles of command-line and object-oriented languages	P	3	E
ENG	102	Writing II	Argumentative writing. Emphasis on development of a fluent, precise, and versatile prose style. Continued instruction and practice in reading critically, thinking logically, responding to texts, developing research skills, writing substantial essays through systematic revision, addressing specific audiences, expressing ideas in standard and correct English.	P	3	E
STA	296	Statistical Methods and Motivations	Introduction to principles of statistics with emphasis on conceptual understanding. Students will articulate results of statistical description of sample data (including bivariate), application of probability distributions, confidence interval estimation and hypothesis testing to demonstrate properly contextualized analysis of real-world data.	P	3	E
CHE	170	Gen College Chemistry I	A study of chemical principles and their application to pure and mixed substances.	P	4	E
UK Core	Any Oral Communication Course	Oral Communication Course	Oral Communication Course	P	3	E
CS	115	Introduction to Computer Programming	This course teaches introductory skills in computer programming using a high-level computer programming language. There is an emphasis on both the principles and practice of computer programming. Covers principles of problem solving by computer and requires completion of a number of programming assignments.	P	3	E
UK Core	Any Heritage	Any Heritage	Any Heritage	P	3	E
CIT	170	Database Design Fundamentals	Provides an overview of database and database management system concepts, internal design models, normalization, network data models, development tools, and applications	P	3	E
MAT	171	Algebra & Trig for Calculus	Serves as the entry-level mathematics class for students in STEM fields. Prepares students for success in Calculus I. Develops fluency in the manipulation of polynomial, rational, radical, exponential, logarithmic, and trigonometric functions in order to solve equations, inequalities, and application problems. Familiarizes students with the graphs of the aforementioned functions. Includes linear and nonlinear systems of equations. Students may not receive credit for both MAT 171 and any other College Algebra, Trigonometry, or Precalculus course. Credit not available on the basis of special examination.	P	5	E
CS	215	Introduction to Pgm Design Abstraction/prob solv	The course covers introductory object-oriented problem solving, design, and programming engineering. Fundamental elements of data structures and algorithm design will be addressed. An equally balanced effort will be devoted to the three main threads in the course: concepts, programming language skills, and rudiments of object-oriented programming and software engineering.	P	4	E
UK Core	Any Humanities	Any Humanities	Any Humanities	P	3	E
ELT	110	DC Circuits + Lab	Introduces application of basic DC and AC circuits, including circuit analysis techniques with discussion of introductory magnetism and transformer principles. Emphasizes design, construction, and troubleshooting of simple DC and AC circuits in laboratory exercises.	P	5	E
PHY	211	General Physics	First part of a two-semester survey of classical and modern physics, focusing on the motion of solids and fluids as governed by Newton's Laws and by the conservation laws of energy, momentum, and angular momentum.	P	5	E
UK Core	Any Social and Behavioral Science Course	Social and Behavioral Science Course * Needs to be different than the first	Social and Behavioral Science Course * Needs to be different than the first	P	3	E
ELT	120	Digital Logic + Lab	Introduces theory and application of digital logic methods. Includes Boolean algebra, combinational logic theory, sequential circuits, number systems and codes, and design and troubleshooting of digital logic circuits.	P	3	E
CIT	160/161	Introduction to Networks	Introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. Introduces the principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations. Helps students to be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.	P	4	E
CPT	223	AC Circuits + Lab	Develops skills and practice in the design, fabrication, measurement, and analysis of practical AC circuits used in electrical systems. Topics include, reactance and impedance, AC power and power factor, maximum power transfer, frequency response, and bandwidth	C	4	N
CPT	287	Introduction to Embedded System + Lab	This course introduces typical structures and applications of embedded systems. Emphasis will be on: hardware, programming, input/output methods, typical peripherals/interfacing (including Timers, ADC and micro to micro communications), interrupt handling and small system design and applications using high level programming languages. Microprocessor architecture and assembly programming will be introduced to provide a base for more advanced digital designs. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics.	C	4	N
MA	113	Calculus I	A course in one-variable calculus, including topics from analytic geometry. Derivatives and integrals of elementary functions (including the trigonometric functions) with applications. Lecture, three hours; recitation, two hours per week. Students may not receive credit for MA 113 and MA 137. Prereq: Math ACT of 27 or above, or math SAT of 620 or above, or MA 109 and MA 112, or MA 110, or consent of the department. Students who enroll in MA 113 based on their test scores should have completed a year of pre-calculus study in high school that includes the study of the trigonometric functions. Note: Math placement test recommended	C	4	E
CPT	314	Wireless Communication	A discussion of the evolution of wireless networks, their state-of-the-art, and modern trends in wireless networking. Topics include: introduction to the Physical layer concepts for wireless communication, Wireless Local Area Networks (LANs), Wireless Personal Area Networks (PANs), Wireless Regional Area Networks (WRAN), Cellular Networks, Mobile Networks, Internet of Things, Vehicular Networks, Sensor Networks and Security and Privacy in Wireless Networks.	C	3	N
CPT	315	Digital System Design	This course covers the design and simulation of digital circuits using modern digital design techniques. Using a hardware description language, students will design, synthesize, and analyze finite state machines and combinational, sequential, and arithmetic logic circuits. Topics will include design for synthesis, verification techniques, memory circuits, programmable logic devices, and implementation technologies. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics.	C	3	N
CPT	316	Electronics Prototyping and Construction	This course covers the analysis, design and implementation of active electronic circuits using diodes, bipolar and field effect transistors and operational amplifiers. The electrical and switching characteristics of semiconductor devices used for analog and digital circuits will be emphasized. Printed circuit board (PCB) design and construction. Laboratory exercises are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics.	C	4	N
CPT	317	Software Engineering Process and Methods	An introduction to software engineering and software life-cycle. Survey of software development process and techniques to ensure the quality of software product, build management, testing, and maintenance tasks performed as software evolves.	C	3	N

WRD	204	Technical Writing	Instruction and experience in writing for science and technology. Emphasis on clarity, conciseness, and effectiveness in preparing letters, memos, and reports for specific audiences	C	3	E
CPT	409	Capstone I	The CPT 409 is the first of a two-semester sequence capstone course, and CPT 410 is the second in the series. It is a required course for all students in the CPT program. It is a team and project course requiring extensive research, analysis, prototyping, testing and evaluation. Students will have completed a wide variety of technical courses by their senior year and will have the background necessary for the completion of a comprehensive design project. This senior design project is completed under the guidance of a CPT faculty member who serves as the course director. Senior design is intended to provide problem analyses and system design experiences similar to what is encountered by computer engineering technology professionals, and provides opportunities to practice and perfect the skills of technical writing and oral presentation. A typical project starts with several weeks of intensive investigation and analyses of the design of hardware, software, and/or network. The initial research will be followed by a combination of conceptual design, engineering calculations, computer-aided drafting, analyses, program development or detailed design, materials selection, prototype building, testing and modifying. Students are required to prepare a final report and make an oral presentation to department faculty, other engineering technology students, and industry sponsors. Students are expected to maintain a logbook to document the progress and time invested in the project. Each student is expected to spend a minimum of nine hours per week to complete their project successfully.	C	3	N
CPT	419	Signals, Systems and Transforms + Lab	Develops the analytical skills to design, develop, and simulate analog and digital filters, control systems, and advanced electronic circuits such as those used in robotics, digital communications, and wireless systems. Continuous-time and discrete-time linear, time-invariant, casual systems are examined throughout the course. Topics include Fourier series, the Laplace transform, signal sampling, and the z-transform. Advanced circuit analysis techniques include circuit characterization in the s-plane.	C	3	N
CPT	420	Embedded Applications	This is an embedded systems architecture and design course. Microprocessor, as well as system level design principles will be analyzed from both a hardware and software perspective. Assembly language and C are used to develop software applications for a 32-bit embedded processor. Application software emphasizes interrupt driven operation and peripheral interfacing. During the course's laboratory component, students will be design and debug hardware and software systems, evaluate design trade-offs and choose the best design solution, and perform functional and timing analysis of an embedded system.	C	4	N
CPT/LST	400	Engineering Economics	This course introduces students to the concepts of the time value of money, analysis of alternatives using net present value (NVP), and internal rate of return (IRR), depreciation, taxes, and inflation. Monte Carlo simulation is used throughout the course to study variability in engineering designs and the resulting economic impact. Engineering ethics case studies are presented and analyzed. Contemporary economic issues affecting engineers are discussed.	C	2	N
CPT	410	Capstone II	The CPT 410 is the second of a two-semester sequence capstone course, and CPT 409 is the first in the series. It is a required course for all students in the CPT program. It is a team and project course requiring extensive research, analysis, prototyping, testing, and evaluation. Students will have completed a wide variety of technical courses by their senior year and will have the background necessary for the completion of a comprehensive design project. The senior design project is completed under the guidance of a CPT faculty member who serves as the course director. Senior design is intended to provide a problem analysis and system design experience similar to what is encountered by computer engineering technology professionals, and an opportunity to practice and perfect the skills of technical writing and oral presentation. A typical project starts with several weeks of intensive investigation and analysis of the design of hardware, software, and/or network. The initial research will be followed by a combination of conceptual design, engineering calculations, computer-aided drafting, analysis, program development or material selection, building prototypes, testing, modifications, and detailed design. Students are required to prepare a final report and make an oral presentation to department faculty, other engineering technology students, and industry sponsors. Students are expected to maintain a logbook to document the progress and time invested in the project. A student is expected to spend a minimum of nine hours per week to complete their project successfully.	C	3	N
CPT/LST	402	Fundamentals Of OSHA	This class will cover the basics of company safety and health program and the minimum requirements under Federal OSHA and State OSHA. Students will also receive their 30 hour OSHA General Industry Safety and Health Training Card from OSHA at the successful completion of the course. All students will present their findings for specific industry hazards	C	2	N
CPT/LST	425	Project Management	This course provides a systematic and thorough introduction to all aspects of project management. Projects are an increasingly important aspect of modern business. Therefore, the course underlines the importance of understanding the relationship between projects and the strategic goals of the organization. The course also discusses the technical, cultural, and interpersonal skills necessary to manage projects from start to finish successfully.	C	3	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) **Note: number recorded will**		118	NA

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable) **Note: number recorded will**		0	NA

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
CPT	430	Digital Signal Processing	Develops the knowledge and ability to process signals using Digital Signal Processing (DSP) techniques. Starts with foundational concepts in sampling, probability, statistics, noise, fixed and floating point number systems, and describes how they affect real world performance of DSP systems. Fundamental principles of linearity, duality, and impulse responses. Students get an integrated lab experience writing DSP code that executes in real-time on DSP hardware.	P	4	N
CPT/LST	401	Engineering Analysis & Applications	Students in this course will study how to conduct engineering analysis using Microsoft Excel. This course provides students with a strong foundation in problem solving using Excel	P	3	N
CPT	313	Data Acquisition and Instrumentation	The course prepares students in LabVIEW programming, the concepts and integration of sensor and transducers, interface electronics, data acquisition and instrument control hardware/software. The include student laboratory design projects. The course also requires an individual research report on a specific industrial instrumentation system of each student's choice. The distinction between lecture and laboratory hours is blurred in this course since the course is exploration and project driven. The lab/lecture hours are interchangeably based on students' need.	p	3	N
CPT/LST	300	Analytic Methods in Engineering Technology	Study of mathematical methods and techniques typically used in solving engineering problems. Emphasis is placed on the applications of the various techniques and on the effective utilization of modern computer simulation tools.	P	3	N

CS	371	Introduction to Computer Networking	Introduction to the principles and concepts of the Internet; data communications and digital channel characteristics; networking applications and protocols, client-server paradigm and network programming; reliable data transfer, end-to-end transport; addressing, forwarding and routing, datagram networks; media access control, data link control; selected topics from cloud computing, network security and network management. Concepts are combined with programming and other hands-on assignments to enhance the learning of these topics.	P	3	E
CS	405G	Introduction to Database Systems	Study of fundamental concepts behind the design, implementation and application of database systems. Brief review of entity-relationship, hierarchial and network database models and an in-depth coverage of the relational model including relatinal algebra and calculi, relational database theory, concepts in schema design and commerical database languages.	P	3	E
CS	498	Software Engineering for Senior Project	Current approaches -- practice and technologies -- for developing reliable software: specifications, testing, and verification. Individual and team assignments focused on applying these approaches to software systems. A significant communication and composition component related to specifying, designing, presenting, and documenting software systems.	P	3	E
CS	316	Web Programming	This course introduces students to the World Wide Web, languages and techniques used for web programming, data transfer over the Internet, and the tools available in the web environment.	P	3	E
CS	564	Computer Security	This course will introduce students to the basics of computer and software security. It will expose students to topics such as cryptography, secure hash functions, access control models, audit of computer systems, attacks on computer systems and countermeasures, elements of computer forensics, and elements of database and network security.	P	3	E
CS	470G	Introduction to Operating Systems	This course provides an introduction and overivew of operating system design, internals, and administration. Topics include classical operating systems (process management, scheduling, memory management, device drivers, file systems), modern operating systems concepts (kernel/microkernel designs, concurrency, synchronization, interprocess communication, security and protection), and operating system administration.	P	3	E
CS	572	Network Security	This course introduces students to the state of the art of network security problems and solutions. Topics include security issues in computer networks, the Public Key Infrastructure ecosystem, key exchange protocols, and security mechanisms and protocols at the application, transport, network and data link layers. It will also discuss up-to-date development in the field of network security.	P	3	E
			Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table		9	

FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)			Note: number recorded will		0	NA

Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)	118	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	0	NA
	Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	9	NA
	Free Elective Hours (i.e., general program electives) (if applicable)	0	NA
	Total # of credit hours required for Program	127	NA
Information to be completed by PIE Office			
	# of new courses	41	NA
	Total # of Courses (includes new and existing)	127	NA
	Precentage of new courses (more than 25% may require SACS Substantive Change)	32%	NA

University of Kentucky
BS - BACHELOR OF SCIENCE
15.1201-Computer Engineering Technology/Technician.
Submission Date: 05/03/2021 12:52

Full Proposal - Basic Info

Institution :	University of Kentucky
Program Type :	Single Institution
Program Name :	Computer Engineering Technology
Degree Level :	Baccalaureate
Degree Designation :	BACHELOR OF SCIENCE
CIP Code (2-Digit) :	15-ENGINEERING/ENGINEERING-RELATED TECHNOLOGIES/TECHN
CIP Code :	15.1201-Computer Engineering Technology/Technician.
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	5/4/2021

Institutional Contact Information

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University of Kentucky
BS - BACHELOR OF SCIENCE
15.1201-Computer Engineering Technology/Technician.
Submission Date: 05/03/2021 12:52

Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The proposed Bachelor of Science (BS) in Computer Engineering Technology (CPT) degree offers students opportunities to acquire the knowledge, skills, and strengths to develop the engineering acumen for becoming technical leaders. It prepares students to succeed in the design, implementation, integration, and support of computer-based and network systems that are critical to the success of enterprises, projects, research and development, and technical goals. In this increasingly interconnected world, technical experts with the ability to understand, link, use and integrate computer hardware, software, and networks, and who can evolve systems as needs change, are in high and ever-increasing demand.
The proposed four year BS in CPT is designed as a feeder-completer program in which students earn an Associate of Applied Science (AAS) in CPT from the Bluegrass Community and Technical College (BCTC) and then a BS in CPT from the University of Kentucky (UK). In this arrangement, the UK will offer only Junior and Senior level coursework.
The proposed curriculum provides in-depth knowledge of hardware and software design, development, applications, and maintenance. It is based on a solid academic foundation with intensive classroom and laboratory experiences. Students gain strong background knowledge and expertise in cutting-edge developments and applications, and programming languages currently used and under development in industry. Students learn and experience industrial-standard approaches to developing application software as well as state-of-the-art problem-solving techniques for code and firmware development with networking and web operations. The hardware focus of the curriculum is in digital systems design and development. From low-level gate design to high-end microprocessors and current/advancing bus standards, students gain an architectural understanding of computer systems. The curriculum includes in-depth design and analyses of combinational logic, sequential logic and state machines, microcontroller systems, microprocessor systems, and state-of-the-art computer technology.

Does this program have any contentrations

No

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2. Describe how the new program is consistent with the mission and goals of the institution.

The objectives of the proposed BS degree in CPT are consistent with the mission of the UK, the UK-College of Engineering (COE), and the needs of the program's constituents – the students. It develops innovative, creative, and unique future practitioners and leaders in computer technology. The program will recognize and prepare students who can learn best by visualizing concepts through hands-on practice, using the unique strengths of learning-by-doing. It also integrates engineering and craftmanship that will support science, technology, engineering, and mathematics (STEM) workforce development as part of Kentucky's overall economic growth agenda. It aligns with the COE's 2019 strategic plan growth strategy to expand engineering education and technical job opportunities for students.?
The proposed program will benefit:
• Students: As identified by the Kentucky Council on Postsecondary Education (KY CPE), the BS degree in CPT is a critical area of training needed for students within the future economy that will depend on more demanding educational training and a more sophisticated workforce. Currently, UK has no undergraduate CPT program nor a BS in CPT. The proposed program with benefit students, the UK, the Commonwealth of Kentucky and beyond by creating the first BS in CPT within the Commonwealth; currently, students interested in or having the aptitude for a CPT degree have to go outside of Commonwealth to obtain their BS degree. It will also establish a seamless transfer experience between the UK and BCTC for students to be awarded AAS and BS degrees.
• UK: The proposed program offers the UK a strategic response to address critical manufacturing skills shortages in the state and to improve program offerings and enrollment for the COE that are in-line with the UK's and COE's strategic initiatives. It will create a unique CPT program in collaboration with the BCTC, Toyota Motor Manufacturing North America, and a host of other industrial partners.
• Region: The program will provide the manufacturing industry within the Commonwealth a pool of highly trained, fundamentally sound, and motivated personnel, thereby ameliorating talent and skills shortages. It is envisioned to help encourage the founding or relocation of new businesses and manufacturing operations in the Commonwealth. Close collaboration between the UK COE and the BCTC will significantly strengthen Kentucky's workforce development and opportunities.

4. Is there a specialized accrediting agency related to this program?

Yes

4a. If yes, identify accreditor:

ABET

4b. Will accreditation be sought?

Yes

5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

NA

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6. Describe the rationale and need for the program to include how the institution determined need.

The KY CPE seeks to increase the prosperity and well-being of Kentucky's citizens through education and training. Its strategic agenda includes workforce development and fostering research and innovation. KY-CPE recently published in April 2020 it's Engineering Sector Analysis in Kentucky. The report assesses and discusses labor market information along with program demand gap and migration analyses. It evaluates the effectiveness of Kentucky institutions in meeting workforce demand in the engineering sector. The KY CPE report identifies a large gap existing in the area of Engineering Technology. It is an area considered critical for meeting manufacturing job openings and in-state BS educational opportunities.

The KY-CPE findings are consistent with a national trend in which manufacturing skills shortages have been well documented. The following highlights a few examples:

• In November 2017, the McKinsey Global Institute published a report titled "Making it in America: Revitalizing US manufacturing." The report outlined how multiple technology advances are converging and changing manufacturing industries and driven by an explosion in the volume of available data, developments in analytics and machine learning, new forms of human-machine interactions, intelligent robots, interconnected supply chains, and an ability to transmit digital instructions to the physical world. These complementary technologies can run smart, cost-efficient, and automated plants that produce large volumes or highly customized products. Concomitantly, increased knowledge and technology skills are required on factory floors.

• In a December 2019 article published in the Wall Street Journal, entitled "American Factories Demand White-Collar Education for Blue-Collar Work," the authors defined how new manufacturing jobs that require more advanced skills are driving the education level needed by factory workers. For the first time, manufacturers are on track to employ more college graduates than workers with a high-school degree or less education; this change, in part, coincides with manufacturing shifts toward automation that has increased factory output.

• Deloitte and the Manufacturing Institute have been tracking skills shortages for the past 17 years. They have documented how skill shortages continue to swell and threaten to impede the current growth and productivity in the US manufacturing industry. In their November 14, 2018 report entitled "The jobs are here, but where are the people?", Deloitte and the Manufacturing Institute explored the depths of today's talent shortage in manufacturing and how jobs are changing due to technology and automation. They predicted a 53% shortage of skills in the US manufacturing industry by 2028.

In response to local, state, and national skills needs, the proposed program partners the UK with the BCTC and creates a unique, joint feeder-completer educational opportunity within Kentucky.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The objectives of the proposed BS degree in CPT are consistent with the mission of the UK, the UK-College of Engineering (COE), and the needs of the program's constituents – the students. It develops innovative, creative, and unique future practitioners and leaders in computer technology. The program will recognize and prepare students who can learn best by visualizing concepts through hands-on practice, using the unique strengths of learning-by-doing. It also integrates engineering and craftmanship that will support science, technology, engineering, and mathematics (STEM) workforce development as part of Kentucky's overall economic growth agenda. It aligns with the COE's 2019 strategic plan growth strategy to expand engineering education and technical job opportunities for students.?
The proposed program will benefit:
• Students: As identified by the Kentucky Council on Postsecondary Education (KY CPE), the BS degree in CPT is a critical area of training needed for students within the future economy that will depend on more demanding educational training and a more sophisticated workforce. Currently, UK has no undergraduate CPT program nor a BS in CPT. The proposed program with benefit students, the UK, the Commonwealth of Kentucky and beyond by creating the first BS in CPT within the Commonwealth; currently, students interested in or having the aptitude for a CPT degree have to go outside of Commonwealth to obtain their BS degree. It will also establish a seamless transfer experience between the UK and BCTC for students to be awarded AAS and BS degrees.
• UK: The proposed program offers the UK a strategic response to address critical manufacturing skills shortages in the state and to improve program offerings and enrollment for the COE that are in-line with the UK's and COE's strategic initiatives. It will create a unique CPT program in collaboration with the BCTC, Toyota Motor Manufacturing North America, and a host of other industrial partners.
• Region: The program will provide the manufacturing industry within the Commonwealth a pool of highly trained, fundamentally sound, and motivated personnel, thereby ameliorating talent and skills shortages. It is envisioned to help encourage the founding or relocation of new businesses and manufacturing operations in the Commonwealth. Close collaboration between the UK COE and the BCTC will significantly strengthen Kentucky's workforce development and opportunities.

2. Describe how the student learning outcomes for the program will be assessed.

Graduates from the computer engineering technology program will demonstrate:
(PSLO 1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
(PSLO 2) an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
(PSLO 3) an ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
(PSLO 4) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
(PSLO 5) an ability to function effectively as a member as well as a leader on technical teams.

3. Highlight any distinctive qualities of this proposed program.

The proposed BS in CPT would be the only comprehensive computer engineering technology program in the Commonwealth. It will seek to create a synergy that comes from partnering with our community partners, the BCTC, and employers and industries to develop solutions for the critical skill shortages in manufacturing. It will focus on tackling the significant challenges confronting students and the Commonwealth of Kentucky for meeting manufacturing workforce needs. Among the unique features of the CPT Program is the commitment among faculty to stress interdisciplinary collaboration and industrial engagement, and to engage students and community partners in collaborative learning processes.
The proposed program has the significant potential to help attract interdisciplinary faculty who are well-positioned to compete for extramural funding for research, instruction, and outreach programs with industrial partners.

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4. Describe the admissions and graduation requirements for the program.

The proposed BS in CPT is a feeder-completer program in a cooperative arrangement with the BCTC. The UK COE and BCTC shall cooperatively create the academic curriculum. The courses taken at both institutions shall meet their shared curricula requirements of an AAS in CPT from the BCTC and a BS in CPT from the UK. Together, the UK and BCTC will establish the infrastructure at UK and at BCTC that effectively enable students to fulfill their Engineering Technology degree requirements.
Both institutions will ensure that the program satisfies the admission and graduation requirements at each institution. It will facilitate a seamless transfer of credits between the UK and BCTC, and enable the development and implementation of a sequence of courses defined in the shared curricula at both the UK and BCTC.
Based on this academic structure, each institution shall grant a separate academic degree bearing its name and seal with appropriate signatures.
Admissions:
Students shall apply jointly to BCTC and UK, with BCTC becoming the home institution until students complete all requirements for an AAS degree in CPT.? Students who complete their AAS degree requirements within a designated three-year period and who also meet the admission requirements as established by the UK COE, will not be required to reapply to the UK. After students are awarded their AAS from BCTC, UK would become their home institution

The UK catalog year for these students shall be based on the year in which each student was enrolled in the joint program.?

To be accepted to the joint UK/BCTC CPT program, high school students must have an ACT math score of 23 or higher or the SAT equivalent of 570 or higher and an unweighted high school GPA of 2.5 or higher.

Students who are not initially admitted into the program may apply at a later date as a transfer student.

To be accepted into the joint UK/BCTC CPT program, transfer students must have a minimum cumulative college GPA of 2.0 and have completed MA 123 or its equivalent with a grade of C or higher.

5. Describe the administrative oversight to ensure the quality of the program.

The BS in CPT program will be housed in a new department of Engineering Technology (ET) that will have a department Chair and a Director of Undergraduate Studies. They will provide oversight for the program.
The ET department will have an undergraduate curriculum committee that will assess the CPT program every two years and prepare a report summarizing the results. The assessment report is submitted to the Department Chair and the department faculty. The Undergraduate Curriculum Committee will review the assessment report, decide if changes to the curriculum are required, and make recommendations to the faculty at department meetings. Proposed curriculum changes are discussed at department meetings and then approved and implemented as needed.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

NA

7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	127	50	9	

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

The proposed BS in CPT will be the best choice for students who want to solve practical problems and who learn best when given extensive hands-on training and experiences. Since CPT is not currently offered at UK, students in Kentucky who wish to pursue a CPT degree must go outside of the State.

Secondly, the proposed program has a Math ACT Score requirement of 23, while all current engineering programs require a Math ACT Score 25. Hence, the CPT program will target Kentucky High School students interested in engineering but do not meet the Math ACT Score of 25 requirements. Based on the historical applicant pool to the UK COE, Fall 2011-Fall 2016 Cohorts, it is estimated that 465 students would be eligible to be admitted into the UK CPT Program.

Finally, the proposed program will target engineering students who currently leave the COE before graduation. The second-year student fall retention rate in the college for Fall 2018 was 75.2%. Hence, 24.8% of, or 157 students left the COE by their second Fall semester. It is estimated that 50 of these students would have chosen or will choose the CPT Program to stay in the UK COE. Their success is sought.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	10
2022-23	9	34
2023-24	23	86
2024-25	59	130
2025-26	66	145

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Computer Hardware Engineering	88815	37	4.0	81785	15	0.0	99862	10895	5.0
Computer Programmers	75051	757	0.0	71861	372	9.0	81595	67511	0.0
Computer Support Specialist	47023	1747	9.0	45267	1139	16.0	52457	146267	11.0
Computer Systems Analyst	78426	2829	4.0	76596	1191	11.0	85291	219915	9.0
Computer Systems Engineerings/Architects	101376	2154	9.0	98193	1036	11.0	103258	258333	9.0

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2b. Clearly describe evidence of employer demand.

Computer Engineering Technologists are employed as embedded software technologists, computer support specialists, networking support specialists, automation engineers, applications engineers, telecommunications engineers, network support technical engineers, and network administrators. Computer Engineering Technologists are employed by industry, academia, and government labs for manufacturing and analysis.
At the state level, Kentucky is home to 4,500 manufacturing facilities with over 251,910 manufacturing employees. In 2019, Kentucky-Made exports totaled over $33 billion, up from $31.16 billion in 2018. The manufacturing sector remains a primary focus for job creation and retention in Kentucky. With industry 4.0, multiple technology advances are converging and changing manufacturing industries, driven by an explosion in the volume of available data, developments in analytics and machine learning, new forms of human-machine interactions, intelligent robots, interconnected supply chains, and an ability to transmit digital instructions to the physical world. These complementary technologies can run smart, cost-efficient, and automated plants that produce large volumes or highly customized products. Concomitantly, increased knowledge and technology skills are required on factory floors. For the Commonwealth to be prepared for the jobs of the future, we need to train and retain the next generations of our workforce to take on new challenges to start careers in modern manufacturing.
The Economic Modeling, LLC (EMSI) conducted an engineering sector analysis in Kentucky for the Kentucky Council on Postsecondary Education (KY CPE, April 2020). The EMSI report identified Engineering Technology as an area of expansion at the bachelor's degree level within the Commonwealth. The report identified a large gap existing in the following Engineering Technology area to help meet manufacturing job openings in the State:
• Manufacturing Engineering Technology: a 70% gap between annual job openings and yearly average CPE completions.
• Engineering Technology, General: a 57% gap between annual job openings and yearly average CPE completions.
• Computer Engineering, General: a 45% gap between annual job openings and yearly average CPE completions.
The proposed program will enable UK to respond to a critical area for expansion at the bachelor's degree level and, in so doing, help the Commonwealth close these gaps.
At the regional level, the Southeast United States has some of the world's most advanced manufacturing companies in aerospace and automotive, and their parts and equipment suppliers. At the national level, the Manufacturing Institute has been tracking skills shortages for the past 17 years. They have documented how skill shortages continue to swell and threaten to impede the current growth and productivity in the US manufacturing industry. In their November 14, 2018 report entitled "The jobs are here, but where are the people?", Deloitte and the Manufacturing Institute explored the depths of today's talent shortage in manufacturing and how jobs are changing due to technology and automation. They predicted a 53% shortage of skills in the US manufacturing industry by 2028.

Currently, only three schools exist in the Southeast region schools ABET ETAC-accredited programs in Computer Engineering Technology to support the advanced manufacturing workforce. Specifically, these schools are the Kennesaw State University, Middle Tennessee State University, and the University of Southern Mississippi.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

Not Applicable

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

Not Applicable

4b - How will the program support or be supported by other programs within the institution?

The proposed BS CPT program will have shared facilities and some instructional faculty with the Electrical and Computer Engineering Department (ECE) and with the Computer Science Department (CS) at the UK. Collaborative activities are expected between the proposed new program and these existing programs.

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4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

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Full Proposal - Cost: Cost and Funding of the Proposed Program

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A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total Resources Available from Other Non-State Sources					
New :	125000	225000	250000	275000	300000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	"Toyota Motor North America (TMNA) is donating $4.25 million to support the New ET Department as follows: 1) $2 million: Toyota Engineering Technology Diversity Scholarship 2) $1 million: Toyota Engineering Technology Distinguished Professorship 3) $1.25 million for Engineering Technology Laboratory Enhancement, faculty recruitment, and general expenses. This amount is shared between CPT and LST program, with CPT portions included in new funding of $125K per year Also, faculty in the CPT program will be engaged in activities with industry partners, through consulting services and applied research. These activities are estimated to generate income projected as follows: Yr2: $100K, increasing $25K yearly after that."				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Internal					
Allocation :	900000	474583	174792	43464	52884
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	The ET department will collaborate with the Institute of Research for Technology Development (IR4TD) and will share resources. IR4TD will make available $1.5 million for the creation of the ET department and the development and running of the CPT and LST degree program, with $900K allocated to the CPT program. Note this amount carry-forward year to year until the original amount is spent and would not impact the financial solvency of IR4TD's other programs				
Student Tuition					
New :	38398	133350	289956	518109	583401
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	The tuition returns are calculated as follows: # of Student x{[$0.30 (25% NTR to ENG allocated on FTE + 75% NTR to ENG allocated on SCH)] + 60.24*24}				

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Total					
New :	$1,063,398	$832,933	$714,748	$836,573	$936,285
Existing :	$0	$0	$0	$0	$0
Total Funding Sources :	$1,063,398	$832,933	$714,748	$836,573	$936,285

B. Breakdown of Budget Expenses/Requirements	**1st year**	**2nd year**	**3rd year**	**4th year**	**5th year**
Staff: Executive, administrative, and managerial					
New :	14263	14548	14839	15136	15439
Existing :	0	0	0	0	0
Other Professional					
New :	205312	304668	310761	316976	323316
Existing :	0	0	0	0	0
Faculty					
New :	219240	337925	344684	351577	358609
Existing :	0	0	0	0	0
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Staff Includes 5% of Business Officer, and 3 Adminstrative Support positions currently housed within IR4TD. Also split with CPT and LST. These are expanded roles for IR4TD Staff Other professionals include new hires for Academic Advising split between CPT and LST. One full time Lab Manager, and two Lecturer positions dedicated to CPT Two new faculty full time hires Dedicated to CPT (Include 1 DUS for the CPT program) and Department Chair, split 50% between CPT and LST				
Equipment and Instructional Materials					
New :	150000	1000	1000	100000	100000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Note $150K for initial equipment purchases, an additional $100K for equipment, materials, and supplies in the fourth and fifth years.				
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Contractual Services					
New :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total					
New :	$588,815	$658,141	$671,284	$783,689	$797,364
Existing :	$0	$0	$0	$0	$0
Total Budget Expenses/Requirements :	$588,815	$658,141	$671,284	$783,689	$797,364

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Grand Total					
Total Net Cost :	$474,583	$174,792	$43,464	$52,884	$138,921

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

Post-graduate success will be evaluated using alumni surveys. Each year a detailed survey will be distributed to Program alumni to shed light on impressions, and successes or failures, of how the Engineering Technology Program has impacted their life and job opportunities. The survey questions will request information on their experiences since graduation, and on perspectives for other cutting-edge educational experiences in which new and current CPT students should be immersed. The alumni will also be asked to evaluate the importance of Engineering Technology, as well as their level of preparation for employment by the training and education afforded by the CPT Program.

PROPOSED PROGRAM SUMMARY

Instituion: University of Kentucky
Program Name: Lean Systems Engineering Technology
Degree Designation: BACHELOR OF SCIENCE (BS)
Degree Level : Baccalaureate

Program Description

The proposed Bachelor of Science (BS) in Lean Systems Engineering Technology (LST) degree offers students opportunities to acquire the knowledge, skills and strengths to develop the engineering and operations management acumen for becoming technical leaders. It prepares them with advanced skills in continuous improvement processes design to improve efficiency and gives students the skills needed to improve quality output, streamline operations and reduce waste. It focuses on developing lean manufacturing skills of students, training them how to deliver advanced, competitive products that exceed customer expectations and providing them with the ability to deliver the right product to the right place at the right time. The focus on lean systems engineering is imperative because requirements for lean operations and manufacturing skills will continue to grow in the short and long term.

The proposed four year BS in LST is designed as a feeder-completer program in which students earn an Associate in Applied Science (AAS) in Integrated Engineering Technology (IET) from the Bluegrass Community and Technical College (BCTC), and then a BS in LST from the University of Kentucky (UK). In this arrangement, the UK will offer only Junior and Senior level coursework.

The proposed curriculum provides in-depth knowledge and practical training of lean systems operations. It prepares students for thriving in the highly competitive global marketplace by developing advanced skills in Just-In-Time manufacturing, problem-solving, project management, lean enterprise development, logistics, and material and information flow charts (MIFC). The curriculum is based on a solid academic foundation, with intensive classroom and laboratory experiences, and in-depth instruction in Just-In-Time processes, built-in-quality and productivity improvement.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
No

CIP Code: 15.9999
Credit Hours: 127
Institutional Board Approval Date: 2/18/2021
Implementation Date: 8/16/2021

Student Demand

Year 1 - 10

Year 2 - 34
Year 3 - 86
Year 4 - 130
Year 5 - 145

Market Demand

The Kentucky Council on Postsecondary Education (KY CPE) recently published in April 2020 it's Engineering Sector Analysis in Kentucky. The report assesses and discusses labor market information along with program demand gap and migration analyses. It evaluates the effectiveness of Kentucky institutions in meeting workforce demand in the engineering sector. The KY CPE report identifies a large gap existing in the areas of Manufacturing Engineering Technology and Engineering Technology, both of which are considered critical for meeting highly-demanding manufacturing job openings and in-state BS educational opportunities.

The KY-CPE findings are consistent with a national trend in which the skills shortages in manufacturing have been well documented. The following highlights a few examples.

In November 2017,? McKinsey Global Institute published a report titled "Making it in America: Revitalizing US manufacturing." The report outlined how multiple technology advances are converging and changing manufacturing industries, driven by an explosion in the volume of available data, developments in?analytics?and machine learning, new forms of human-machine interactions, intelligent robots, interconnected supply chains, and an ability to transmit digital instructions to the physical world. These complementary technologies can run smart, cost-efficient and automated plants that produce large volumes or highly-customized products. Concomitantly, increased knowledge and technology skills are required on factory floors.

In a December 2019 article published in the Wall Street Journal, entitled "American Factories Demand White-Collar Education for Blue-Collar Work," the authors defined how new manufacturing jobs that require more advanced skills are driving the education level needed by factory workers. For the first time, manufacturers are on track to employ more college graduates than workers with a high-school degree or less education; this change, in part, coincides with manufacturing shifts toward automation that has increased factory output.

Deloitte and the Manufacturing Institute have been tracking skills shortages for the past 17 years. They have documented how skill shortages continue to swell and threaten to impede the current growth and productivity in the US manufacturing industry. In their November 14, 2018 report entitled "The jobs are here, but where are the people?", Deloitte and the Manufacturing Institute explored the depths of today's talent shortage in manufacturing and how jobs are changing due to technology and automation. They predicted a 53% shortage of skills in the US manufacturing industry by 2028.

In response to local, state and national skills needs, the proposed program partners the UK with the BCTC and creates a unique, joint feeder-completer educational opportunity within Kentucky.

Employment Demand

	Regional	State	National
Type Of Job	**Continuous Improvement Engineers/specialists***		
Avg. Wage	$77,526	$77,629	$79,744
# Jobs (Postings)	259	111	6108
Expected Growth	0%	0%	0%
Type Of Job	**Lean Manufacturing Specialists**		
Avg. Wage	$99,320	$78,591	$77,956
# Jobs (Postings)	4	2	431
Expected Growth	0%	0%	0%
Type Of Job	**Manufacturing Engineers**		
Avg. Wage	$71,573	$70,897	$71,181
# Jobs (Postings)	605	377	31330
Expected Growth	8%	11%	8%
Type Of Job	**Manufacturing Production Technicians/technologists**		
Avg. Wage	$40,777	$59,274	$43,963
# Jobs (Postings)	147	88	9294
Expected Growth	7%	4%	9%

Indicate source of market demand information

Data was collected from Burning Glass; they represent actual job postings in the last twelve months and BLS projections from 2019-2028.

*Continuous Improvement Engineers/Specialists & Lean Manufacturing Specialists represent specific job titles and do not have BLS growth projections which are at the occupational level. Wage data is the median job salary from job postings over the last 12 months and the # of job openings is the number of job postings over the last 12 months. Nationally, there were 4,903 postings for job titles in “Continuous Improvement” advertised at Bachelor’s Degree levels with a mean salary of $92,354; these nearly 5,000 job postings were in comparison to 137 job posting advertised at an Associate’s Degree level with a mean salary of $64,204. Similarly, a Bachelor’s Degree was requested in 322 of the 431 job postings in “Lean Manufacturing” nationally.

Academic Demand

NA

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
2086	00197600	Morehead State University	BS	Technology Management Area	2015
2278	00197700	Murray State University	BS		2015
12061	00927500	Northern Kentucky University	BS	Mechatronics Engineering Technology	

Comparison of Objectives/Focus/Curriculum to Similar Programs:
The proposed Bachelor of Science in Lean Systems Engineering Technology program (BS-LST) will be the first of its kind in North America. The program prepares students with the knowledge and skills for a career advancing professional engineering technology within manufacturing technology fields, with an emphasis on Lean Manufacturing Engineering and Lean Operations Management. It includes Just-In-Time (JIT) manufacturing, problem-solving, project management, lean enterprise development, logistics, material and information flow charts (MIFC), and standardized work. The BS-LST graduates will have titles such as Lean?Continuous Improvement Engineer,?Lean Engineer,?Manufacturing?Engineer,? Lean?Process Improvement?Engineer, Supplier Quality?Engineer, Lean Manufacturing Specialist and Quality Engineer.

The Core Courses for the BS-LST include:

Introduction to Just-in-Time?Operations

Manufacturing Simulations, and Material and Information Flow Charts

Introduction to Abnormality Management (Jidoka)

Introduction to Productivity Improvement

System of Quality Assurance and Built-in-Quality

Kaizen of Standardized Work

Problem Solving

Production Instruction, Small Lot?Production and Change over Processes

Logistics

Managing the Shop Floor and Leading kaizen

The programs offered at Morehead State University (MSU) and Nothern Kentucky University (NKU) are distinctively different from what is proposed by the University of Kentucky. Below is a summary of the Bachelor of Science in Technology Management at Morehead State University and the Bachelor of Science in

Mechatronics Engineering Technology:

Morehead State University BS in Technology

The Bachelor of Science in Technology Management (BSTM) at Morehead State University is an online completer degree program for people who have an associate degree in a technology-related field. The two-year program is offered completely online, allowing working professionals the convenience to earn a degree at their own pace. Students can choose between a technology systems option and an information systems option. The BSTM online completer program offers the scheduling flexibility that many working professionals require to complete a 120-hour bachelor's degree with a blend of communication and technology.

Northern Kentucky University BS in Mechatronics Engineering Technology

The Bachelor of Science in Mechatronics Engineering Technology at Northern Kentucky University provides graduates real-world experiential education combined with personalized undergraduate experiences in mechanical, electrical and computer control systems, as well as engineering design and management. This Bachelor's degree program is designed to provide students with the knowledge and skills needed to succeed as technological engineers in today's highly integrated computer controlled manufacturing. Students are required to complete the core plus one track. A minor is not required.

Comparison of Student Populations:
The target audience for the proposed BS-LST undergraduate program includes students seeking distinctive career paths and opportunities in creative industrial design, production and service. Its focus and strengths will be students who learn best by visualizing concepts through hands-on practice by using the strengths of learning-by-doing, and who would thrive with an integrated education involving extensive industrial practicums and participation. Specific, targeted groups include:

(a) high school STEM majors considering careers in manufacturing as a lean? continuous improvement engineer,?lean engineer,?manufacturing?engineer, lean? process improvement?engineer, supplier quality?engineer, lean manufacturing specialist, and quality engineer;

(b) high-school students contemplating a career in engineering but who do not realize the myriad possibilities within or have not yet been exposed to Engineering Technology; and

(c) entering UK engineering students who are uncommitted to a particular field of engineering.

The collaborative UK and BCTC Program will also establish a unique path for students to attain a four-year BS degree in Engineering Technology and provide an attractive alternative for students who currently leave the UK-COE before graduating

with their BS. Even though these targeted student population may overlap, the BS-LST provides a distinctive career pathway that is different from what both MSU and NKU offer.

Access to Existing Programs:
The existing programs provide different career pathways from what the proposed BS-LST program offers.

Feedback from Other Institutions:
Feedback from NKU:

Dear Dr. Akafuah,

I hope you and family are keeping well. Thanks for reaching out to us about your new? program. Comparing our MET program's objectives and outcomes with your new LST program, we do not see any duplicities. Nevertheless, we always value collaboration with other institutes. Good luck with your LST program. Please let me know if I can be of further assistance.

Regards,

Seyed

Seyed M. Allameh, PhD

Professor and Director

Engineering Technology Programs

Northern Kentucky University

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Feedback from Morehead State University:

Dr. Akafuah,

Our faculty do not have concerns regarding your new proposal, Lean Systems Engineering Technology.? We think, this programs graduates can enroll in our Master of Science in Engineering and Technology Management (ETM).??? Thank you,

Ahmad Zargari, Ph.D., CSTM, Professor and Associate Dean

School of Engineering and Computer Science
Smith College of Business and Technology
Morehead State University, Morehead, KY 40351
Voice:? (606) 783-2425????? Fax:? (606) 783-5030
E-mail: ahmad.zargari@moreheadstate.edu
https://www.moreheadstate.edu/secs

Cost

Projected Revenue over Next Five Years ($) : 3875977
Projected Expenses over Next Five Years ($) : 2857211

Will Additional faculty be needed? Yes

The Engineering Technology Department will collaborate with the Institute of Research for Technology Development (IR4TD) and will share resources. IR4TD will make available $1.5 million for the Engineering Technology Department. Also, Toyota Motor North America (TMNA) is donating $4.25 million to support the new Department and per the donor's requests the TMNA funds will are allocated as follows:

A $2 million endowment to create the Toyota Engineering Technology Diversity Scholarship

A $1 million endowment to create the Toyota Engineering Technology Distinguished Professorship

$1.25 million for Engineering Technology Laboratory Enhancement, faculty recruitment and general expenses.

This TMNA funding will support both the CPT and LST programs.

Provide a budgetary rationale for creating this new program

The BS in LST is expected to increase revenue by attracting a new pool of students to UK. It is also projected to increase retention rates and generate tuition income.

Faculty in the LST program will be engaged in activities with industry partners through consulting services, lean implementation coaching and applied research. These activities are estimated to generate income projected as follows: Yr2: $100K, increasing $25K yearly after that.

Course Title (CIP) BS Lean Systems Engineering Technology (15.9999)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
MAT	126	Technical Algebra and Trigonometry	Examines mathematical concepts from algebra and trigonometry. Includes vectors, phasor algebra, variation, trigonometric functions, coordinate systems, system of linear equations, and quadratic, rational, exponential and logarithmic equations.	P	3	E
ENG	101	Writing I	A course in writing emphasizing argument. Instruction and practice in reading critically, thinking logically, responding to texts, developing research skills, writing substantial essays through systematic revision, addressing specific audiences, expressing ideas in standard and correct English. Includes grammar and mechanics review. Notes: (a) Credit not available by special examination; (b) ENG 101 and 102 may not be taken concurrently.	P	3	E
IET	111	Lean safety Culture	Introduces the importance of cultivating daily safe work habits and the predictable negative results of not being safety conscious in the work place. Instructs the students in basic safety culture and prepares them to participate in, conduct, and lead safety walk-throughs. Introduces the student to Kiken Yoshi Training (KYT) or Hazard Prediction Training. Prepares the student to conduct risk assessment activities, construct safety boards, and formulate individual safety commitments.	P	1	E
IET	207	Electro-hydraulics/Pneumatics	Explains the fundamental concepts of fluid power and electro-fluid power systems. Covers the principles of fluid power, calculations of physical properties of fluids and their ability to do work. Introduces the various fluid power components, symbols, circuits. Introduces troubleshooting of fluid power components and systems with an emphasis on safety. Addresses fluids, filters, reservoirs, piping, pumps, actuators, accumulators, control valves, and combination circuits. Lecture/Lab	P	4	E
IET	121	Basic Electricity	Introduces the various elements of basic electricity including the identification of electrical symbols as well as interpretation of schematics, cross referencing prints, tracing circuits, interpreting sequential function charts, line drawings and time charts. Introduces the student to electrical measurement instruments, including digital and analog multimeters, clamp-on ammeters, megohmeters, and the oscilloscope. Concentrates on control logic components and circuit function. Introduces the student to solid state devices and applications.	P	4	E
IET	202	Motor Controls and Sensing Devices	Covers the diversity of control devices including: theory of operation, applications in automation control and troubleshooting and repair. Introduces identification, installation, replacement, and troubleshooting of automation controller circuit boards and modules. Includes the installation, maintenance and troubleshooting of common input devices. Provides for discussion of methods of motor controls including on-off, proportional, integral, and derivative including PID loop tuning and quality. Covers automation output devices including AC, DC, and servo motors, variable speed drives, relays, motor starters and sizing of components for various applications. Lecture/Lab	P	4	E
IET	208	Mechanical Drive Systems	Introduces safety, maintenance techniques and procedures used to maintain industrial equipment, including industrial couplings, chains, sprockets, belts, bearings, shafts, brakes, clutches, gears and cams. Addresses the principles of power transmission, calculations of speed and force and how they affect a power transmission system. Lecture/Lab	P	4	E
IET	112	Lean Manufacturing Concepts	Instructs the student in the concepts of value-added product, maintenance value-added product, value-added work and necessary work. Explains the process of how Toyota earns profit. Demonstrates the Toyota Production System for Maintenance using the House framework. Describes and explains the three Ms and the seven Mudas and their relationship to maintenance and production.	P	1	E
PHY	151	Introduction to Physics	A lecture demonstration course covering the mechanics of solids, liquids, gases, heat, and sound	P	3	E
ENG	102	Writing II	Argumentative writing. Emphasis on development of a fluent, precise, and versatile prose style. Continued instruction and practice in reading critically, thinking logically, responding to texts, developing research skills, writing substantial essays through systematic revision, addressing specific audiences, expressing ideas in standard and correct English.	P	3	E
MAT	170	Elementary Calc & Its Applications	Provides an introduction to differential and integral calculus with applications in biological sciences, social sciences, physical sciences, or business with an analysis of algebraic, exponential, and logarithmic functions.	P	3	E
IET	104	Blueprint Reading/Schematics	Introduces the fundamental information in drafting necessary to retrieve read, manipulate and understand a mechanical part print. Instructs students to recognize, identify, describe, and relate the components used in schematics, along with their symbols and connectors, to describe electrical, electronics, pneumatics, hydraulics, and piping circuits, as well as welding and joining symbols interpretation	P	2	E
IET	128	Machine Tool Operations	Provides the basic principles needed for a solid foundation in machine tool technology. Covers shop safety, bench work, drill press, power saw, measurement, and mills.	p	3	E
IET	113	Lean 5S Methodology	Introduces the fundamental 5S process involving the five step progression described by the Japanese words Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. Instructs the students in the sequence involving classifying and sorting, ordering and aligning, cleaning and sweeping up, standardizing, and developing a process of sustainable practice in the workplace. Fosters the development of a workplace organization in which safety and efficiency are always paramount.	P	1	E
UK Core		Social and Behavioral Science (Not SOC)	Social and Behavioral Science (Not SOC)	P	3	E

IET	204	Automated Motor Controls	Introduces Programmable Logic Controllers (PLC) and elements needed for an automated industrial control system. Introduces memory and project organization within a PLC and provides instruction in basic numbering systems, computer and PLC terminology. Introduces PLC control functions, program structures, language standards, wiring and troubleshooting methods, as well as, real world communications. Requires the student to program a PLC which may include a combination of ladder logic, structured text, sequential function chart and/or function block languages. Includes various protocols of industrial communications used between PLC controlled machines, PLC to PLC, PLC to computer, and computer to computer. Lecture/Lab	P	6	E
IET	114	Lean Problem Solving Methodology	Introduces the Toyota Business Practice model, the 8 step Toyota Problem Solving method, and the 10 part Toyota Drive and Dedication model. Instructs the students to clarify the problem, break it down to analyze it, set achievable targets, analyze the root cause, develop countermeasures, evaluate results and the process, standardize the results, and learn from failures. Fosters the development of a customer first philosophy involving all the stakeholders.	P	1	E
UK Core		Oral Communications	Oral Communications	p	3	E
CAD	100	Introduction to Computer-Aided Design	Applies fundamental principles and capabilities of CAD, basic drafting conventions, and operations. Provides an in-depth study of computer aided drafting commands, terminology, command utilization, and skill development.	P	3	E
IET	110	Welding and Fabrication	Provides application of basic welding skills used in SMAW (Stick), GMAW (MIG), GTAW (TIG) and Oxy-Fuel.	P	4	E
IET	205	Robot Maintenance	Introduces robotics in regard to industrial robotic safety standards, applications, types of classes for industrial robots, basic system components, robotic motion concepts, key programming techniques, definitions and the common terms associated with computer integrated manufacturing (CIM) as it relates to robotic cells. Instructs students on the mastering concepts of preventive maintenance techniques required for a robot and their backup systems in addition to recovery procedures needed to interpret robot error codes and perform a safe recovery start up procedure on robotics equipment, as well as integrating robotic applications in a PLC-controlled, automated system.	P	5	E
IET	115	Lean Machine Reliability	Introduces the Toyota Maintenance Reliability training. Describes the difference between corrective maintenance and preventive maintenance. Breaks down proactive maintenance and the underlying tools and constituent processes. Instructs the students in the various individual units in a system and the steps in evaluating failure mode risks and countermeasures	P	1	E
UK Core		Heritage	Heritage	p	3	E
UK Core		Social and Behavioral Science	Social and Behavioral Science	P	3	E
ME	205	Computer Aided Engineering Graphics	Combines freehand sketching techniques, both orthographic and pictorial, and the use of a solid modeling program to describe and define mechanical objects using current industrial standards. An introduction to basic dimensioning and tolerancing techniques is included.	C	3	E
WRD	204	Technical Writing	Instruction and experience in writing for science and technology. Emphasis on clarity, conciseness, and effectiveness in preparing letters, memos, and reports for specific audiences	C	3	E
UK Core		Arts & Creativity	Arts & Creativity	P	3	E
LST	301	Introduction to Just-in-Time Operations	This course will provide the student with the correct and unique understanding of Just-In-Time (JIT) as developed and practiced in lean organizations. The course includes a combination of learning methods such as lectures, virtual simulations, process videos, in-class demonstrations and hands-on participatory demonstrations by the students. All methods used will be designed to teach the tools, techniques and philosophy of JIT. Students will construct JIT documents and be able to explain and evaluate processes using the lean tools related to Just In Time. Examples of the tools, techniques and concepts include Simple & Continuous Flow, Material & Information Stagnation, Pace of Production versus Pace of Sales (Takt Time) and Standardized Work	C	3	N

LST	302	Manufacturing Simulation & Material and Information Flow Charts	The course introduces the fundamentals of Material & Information Flow Charts (MIFC). MIFC uses visualization and mapping techniques to map the value chain as applied in lean manufacturing. It helps organizations prioritize and guide improvement strategies. A manufacturing simulation program(s) that will be used as a framework for the application of many of the Lean concepts taught throughout the LST program will be introduced in this course. The course uses the simulation software to build a greater understanding of MIFC	C	4	N
LST	303	Introduction to Abnormality Management (Jidoka)	This course will present the fundamentals of Abnormality Management which is sometimes referred to as Jidoka by lean organizations such as Toyota. The lean concepts of stop and notify of abnormality, stop after 1 cycle completes, separation of man and machine, necessary conditions to insure quality, self-process completion will be taught along with tools and techniques such as Mistake Proofing, First In, First Out, Performance Analysis Board (AB), Andon, AB Control and Fixed Position Stop System. The content will be brought forward by lectures, virtual simulation of manufacturing & non-manufacturing systems, hands-on visualizations using Lean tools and by in class demonstrations by students.	C	4	N
LST	304	Introduction to Productivity Improvement	This course will introduce the student to the history and fundamentals of Productivity Improvement as used by lean organizations such as Toyota. Some of the lean tools, techniques and concepts that will be taught include, Takt Time, Work Balance Chart, Human Motion Wheel, Steps for Machine Cycle Time Improvement, Steps for Changeover Improvement, Steps to Create a Lean Model Line, Actual vs. Required Manpower, Operational Availability versus Overall Equipment Effectiveness, Fluctuation Kaizen and Cycle Time Kaizen. Students will be exposed to the actual productivity terms and definitions used within lean organizations. Lecture, virtual simulations, video of actual processes and in-class, hands-on demonstrations by students will be employed to demonstrate the concepts, tools and techniques of Productivity Improvement.	C	4	N
LST	305	System of Quality Assurrance & Built-in-Quality	Students taking this course will study in-depth the history and fundamentals of Lean Quality Assurance system and the concept of Built-in-Quality. The course consists of a combination of learning methods such as lectures, virtual simulations, process videos and in-class demonstrations designed to teach the Lean tools and the philosophy behind them. The Lean tools and techniques that will be studied include Change-Point Management, Separation of Man and Machine and the Seven Quality Tools.	C	4	N
LST	306	Kaizen of Standardized Work	Students taking this course will -study in-depth the foundational purpose of standardization and its application in three different types of Standardized Work (SW) to establish and maintain a baseline for continuous improvement (Kaizen) in Lean organizations. Students will study and practice three types of SW used by companies seeking to apply the Lean principles of Standardization and Kaizen to support the continuous improvement of all their processes and people. The course consists of a combination of learning methods such as lectures, virtual simulations, process videos and in-class demonstrations designed to enable students to gain experience and practice with the tools associated with SW as well as the thinking and strategies of Kaizen as they are applied to continuously improve both SW and the thinking and creativity of the students themselves.	C	4	N
LST	409	Capstone I	The LST 409 is the first of a two-semester sequence capstone course, and LST 410 is the second in the series. It is a required course for all students in the LST program. It is a team and project course requiring extensive research, analysis, prototyping, testing, and evaluation. Students will have completed a wide variety of technical courses by their senior year and will have the background necessary for the completion of a comprehensive design project. The senior design project is completed under the guidance of a LST faculty member who serves as the course director. Senior design is intended to provide a problem analysis and system design experience similar to what is encountered by manufacturing and lean engineering professionals, and an opportunity to practice and perfect the skills of technical writing and oral presentation. A typical project starts with several weeks of intensive investigation and analysis of the design of manufacturing and lean processes. The initial research will be followed by a combination of conceptual design, engineering calculations, computer-aided drafting, analysis, or material selection, building prototypes, testing, modifications, and detailed design. Students are required to prepare a final report and make an oral presentation to department faculty, other engineering technology students, and industry sponsors. Students are expected to maintain a logbook to document the progress and time invested in the project. A student is expected to spend a minimum of nine hours per week to complete their project successfully.	C	3	N
LST	406	Problem Solving II	This course will introduce the history and fundamentals of problem solving within lean organizations such as Toyota. Lectures, case studies, virtual manufacturing simulations and in-class, hands-on demonstrations will be used to provide instruction on practical problem solving and eight step problem solving. Lean tools and techniques such as A3, Performance Analysis Board, Andon, Work Standards, Standardized Work, and Visualization of Normal versus Abnormal will be demonstrated and utilized in the course. Each step of problem solving will be discussed in-depth along with all the terms defined by and commonly used in problem solving at Lean Organization.	C	4	N
LST	403	Production Instruction, Small Lot Production & Change over Processes	This course will introduce the history and fundamentals of production instruction systems and small lot production based on the Toyota Production System, which is used in many organizations worldwide. The course will demonstrate how they can be applied in both manufacturing and non-manufacturing applications. Some topics covered will include fixed quantity systems, A, B, and C type systems, one by one production systems, lot production systems and pattern systems, kanban calculation, fixed time systems, along with the 5 Steps of change over kaizen. The course material presentation methods will include lectures, virtual simulations in manufacturing and service-oriented processes, in-class hands-on demonstrations, and videos of processes.	C	4	N
LST	410	Capstone II	The LST 410 is the second of a two-semester sequence capstone course, and LST 409 is the first in the series. It is a required course for all students in the LST program. It is a team and project course requiring extensive research, analysis, prototyping, testing, and evaluation. Students will have completed a wide variety of technical courses by their senior year and will have the background necessary for the completion of a comprehensive design project. The senior design project is completed under the guidance of a LST faculty member who serves as the course director. Senior design is intended to provide a problem analysis and system design experience similar to what is encountered by manufacturing and lean engineering professionals, and an opportunity to practice and perfect the skills of technical writing and oral presentation. A typical project starts with several weeks of intensive investigation and analysis of the design of manufacturing and lean processes. The initial research will be followed by a combination of conceptual design, engineering calculations, computer-aided drafting, analysis, or material selection, building prototypes, testing, modifications, and detailed design. Students are required to prepare a final report and make an oral presentation to department faculty, other engineering technology students, and industry sponsors. Students are expected to maintain a logbook to document the progress and time invested in the project. A student is expected to spend a minimum of nine hours per week to complete their project successfully.	C	3	N
LST	404	Logistics	This course will introduce the history, and the fundamentals of internal and external logistics as practiced by Lean organizations such as Toyota in its well know Toyota Production System (TPS). The unique basic thinking of logistics, as defined by TPS, will be a major portion of this course's content. In addition, the application of methods developed and used by Lean organizations will be explained and studied. Some examples of topics that will be taught are fixed quantity variable time systems, fixed time variable quantity systems, replenishment systems, high frequency transfer of material and information, pull system of production, cross dock systems, milk run routes, separation systems, and progress unload systems. The course consists of a combination of learning methods such as lectures, virtual simulations, process videos, and in-class demonstrations designed to teach the Lean Systems tools of Just-in-Time (JIT) and the philosophy behind the tools.	C	3	N

LST	405	Managing the Shop Floor and Leading kaizen	Students taking this course will -study in-depth the philosophies, capabilities, and techniques required for the role of implementing and managing Lean shop floor operations as well as leading the development, implementation, and evaluation of Kaizen improvement strategies and activities both in production and non-production environments. The course consists of a combination of learning methods such as lectures, simulations, process videos and in-class demonstrations designed to enable students to gain experience with the systematic implementation and management of Lean practices and tools as well as the writing, communication, and team-building skills associated with developing and evaluating Lean documentation tools to support effective problem solving and continuous improvement activities.	C	4	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) **Note: number recorded will automatically populate Core Hours in "Summary of Total Program Hours" table**		**124**	**NA**

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
		Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable)	**Note: number recorded will automatically populate Program Option hours in "Summary of Total Program Hours" table**		**0**	**NA**

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
CPT/LST	**400**	Engineering Economics	**This course introduces students to the concepts of the time value of money, analysis of alternatives using net present value (NVP), and internal rate of return (IRR), depreciation, taxes, and inflation. Monte Carlo simulation is used throughout the course to study variability in engineering designs and the resulting economic impact. Engineering ethics case studies are presented and analyzed. Contemporary economic issues affecting engineers are discussed.**	**P**	**2**	**N**
CPT/LST	**425**	Project Management	**This course provides a systematic and thorough introduction to all aspects of project management. Projects are an increasingly important aspect of modern business. Therefore, the course underlines the importance of understanding the relationship between projects and the strategic goals of the organization. The course also discusses the technical, cultural, and interpersonal skills necessary to manage projects from start to finish successfully.**	**P**	**3**	**N**
CPT/LST	**300**	Analytic Methods in Engineering Technology	**Study of mathematical methods and techniques typically used in solving engineering problems. Emphasis is placed on the applications of the various techniques and on the effective utilization of modern computer simulation tools.**	**P**	**3**	**N**
CPT/LST	**402**	Fundamentals Of OSHA	**This class will cover the basics of company safety and health program and the minimum requirements under Federal OSHA and State OSHA. Students will also receive their 30 hour OSHA General Industry Safety and Health Training Card from OSHA at the successful completion of the course. All students will present their findings for specific industry hazards**	**P**	**2**	**N**
CPT/LST	**401**	Engineering Analysis & Applications	**Students in this course will study how to conduct engineering analysis using Microsoft Excel. This course provides students with a strong foundation in problem solving using Excel**	**P**	**3**	**N**
			# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) **Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table**		**3**	**NA**

FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or	Credit Hours	Existing (E) or New (N) Course

Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)				**Note: number recorded will**	**0**	**NA**
		Summary of Total Program Hours		**Required Core Hours (i.e., # of hours in degree program core)**	**124**	NA
				Required Program Options - Track/Concentration/Specialty Hours (if applicable)	**0**	NA
				Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)	**3**	NA
				Free Elective Hours (i.e., general program electives) (if applicable)	**0**	NA
				Total # of credit hours required for Program	**127**	**NA**
		Information to be completed by PIE Office				
				# of new courses	53	NA
				Total # of Courses (includes new and existing)	127	NA
				Precentage of new courses (more than 25% may require SACS Substantive Change)	42%	NA

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Full Proposal - Basic Info

Institution :	University of Kentucky
Program Type :	Single Institution
Program Name :	Lean Systems Engineering Technology
Degree Level :	Baccalaureate
Degree Designation :	BACHELOR OF SCIENCE
CIP Code (2-Digit) :	15-ENGINEERING/ENGINEERING-RELATED TECHNOLOGIES/TECHN
CIP Code :	15.9999-Engineering/Engineering-Related Technologies/Techn
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	5/4/2021

Institutional Contact Information

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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The proposed Bachelor of Science (BS) in Lean Systems Engineering Technology (LST) degree offers students opportunities to acquire the knowledge, skills and strengths to develop the engineering and operations management acumen for becoming technical leaders. It prepares them with advanced skills in continuous improvement processes design to improve efficiency and gives students the skills needed to improve quality output, streamline operations and reduce waste. It focuses on developing lean manufacturing skills of students, training them how to deliver advanced, competitive products that exceed customer expectations and providing them with the ability to deliver the right product to the right place at the right time. The focus on lean systems engineering is imperative because requirements for lean operations and manufacturing skills will continue to grow in the short and long term.

The proposed four year BS in LST is designed as a feeder-completer program in which students earn an Associate in Applied Science (AAS) in Integrated Engineering Technology (IET) from the Bluegrass Community and Technical College (BCTC), and then a BS in LST from the University of Kentucky (UK). In this arrangement, the UK will offer only Junior and Senior level coursework.

The proposed curriculum provides in-depth knowledge and practical training of lean systems operations. It prepares students for thriving in the highly competitive global marketplace by developing advanced skills in Just-In-Time manufacturing, problem-solving, project management, lean enterprise development, logistics, and material and information flow charts (MIFC). The curriculum is based on a solid academic foundation, with intensive classroom and laboratory experiences, and in-depth instruction in Just-In-Time processes, built-in-quality and productivity improvement.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

The mission of the University of Kentucky's, Kentucky's flagship institution of higher education, includes expanding educational opportunities to address current challenges and opportunities. UK's strategic plan for undergraduate-student success includes developing new undergraduate programs that increase professional opportunities in industry, public service, and academia (Ref. 2015-2020 Strategic Plan, Undergraduate Student Success, Initiative 2).
As outlined in the Kentucky Council on Postsecondary Education (KY CPE) April 2020, Engineering Sector Analysis report, a significant gap exists in the area of Engineering Technology. It is an area considered critical for meeting manufacturing job openings and in-state BS educational opportunities. The CPE identified manufacturing engineering technology and engineering technology, general as an area of growth, to meet manufacturing job opportunities within the Commonwealth.
The LST program will also increase the breadth and recognition of the UK COE, and will support the COE's goal of expanding its current 3,900-student enrollment to 6,000 by 2025.
The unique cooperative partnership with the BCTC creates a unique, joint feeder-completer educational opportunity within Kentucky.

4. Is there a specialized accrediting agency related to this program?

Yes

4a. If yes, identify accreditor:

ABET

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4b. Will accreditation be sought?

Yes

5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

NA

6. Describe the rationale and need for the program to include how the institution determined need.

The KY CPE seeks to increase the prosperity and well-being of Kentucky's citizens through education and training. Its strategic agenda includes workforce development and fostering research and innovation. KY-CPE recently published in April 2020 it's Engineering Sector Analysis in Kentucky. The report assesses and discusses labor market information along with program demand gap and migration analyses. It evaluates the effectiveness of Kentucky institutions in meeting workforce demand in the engineering sector. The KY CPE report identifies a large gap existing in the area of Engineering Technology. It is an area considered critical for meeting manufacturing job openings and in-state BS educational opportunities.
The KY-CPE findings are consistent with a national trend in which manufacturing skills shortages have been well documented. The following highlights a few examples:
• In November 2017, the McKinsey Global Institute published a report titled "Making it in America: Revitalizing US manufacturing." The report outlined how multiple technology advances are converging and changing manufacturing industries and driven by an explosion in the volume of available data, developments in analytics and machine learning, new forms of human-machine interactions, intelligent robots, interconnected supply chains, and an ability to transmit digital instructions to the physical world. These complementary technologies can run smart, cost-efficient, and automated plants that produce large volumes or highly customized products. Concomitantly, increased knowledge and technology skills are required on factory floors.
• In a December 2019 article published in the Wall Street Journal, entitled "American Factories Demand White-Collar Education for Blue-Collar Work," the authors defined how new manufacturing jobs that require more advanced skills are driving the education level needed by factory workers. For the first time, manufacturers are on track to employ more college graduates than workers with a high-school degree or less education; this change, in part, coincides with manufacturing shifts toward automation that has increased factory output.
• Deloitte and the Manufacturing Institute have been tracking skills shortages for the past 17 years. They have documented how skill shortages continue to swell and threaten to impede the current growth and productivity in the US manufacturing industry. In their November 14, 2018 report entitled "The jobs are here, but where are the people?", Deloitte and the Manufacturing Institute explored the depths of today's talent shortage in manufacturing and how jobs are changing due to technology and automation. They predicted a 53% shortage of skills in the US manufacturing industry by 2028.
In response to local, state, and national skills needs, the proposed program partners the UK with the BCTC and creates a unique, joint feeder-completer educational opportunity within Kentucky.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The objectives of the proposed BS degree in LST are consistent with the mission of the UK, the UK-College of Engineering (COE), and the needs of the program's constituents – the students. It develops innovative, creative, and unique future practitioners and leaders in Lean Systems Engineering Technology. The program will recognize and prepare students who can learn best by visualizing concepts through hands-on practice, using the unique strengths of learning-by-doing. It also integrates engineering and craftmanship that will support science, technology, engineering, and mathematics (STEM) workforce development as part of Kentucky's overall economic growth agenda. It aligns with the COE's 2019 strategic plan growth strategy to expand engineering education and technical job opportunities for students.?
The proposed program will benefit:
• Students: As identified by the CPE, the BS degree in LST is a critical area of training needed for students within the future economy that will depend on more demanding educational training and a more sophisticated workforce. Currently, UK has no undergraduate LST program nor a BS in LST. The proposed program with benefit students, the UK, the Commonwealth of Kentucky and beyond by creating the first BS in LST within the Commonwealth; currently, students interested in or having the aptitude for a LST degree have no options at the Bachelors level in the country. It will also establish a seamless transfer experience between the UK and BCTC for students to be awarded AAS and BS degrees.
• UK: The proposed program offers the UK a strategic response to address critical manufacturing skills shortages in the state and to improve program offerings and enrollment for the COE that are in-line with the UK's and COE's strategic initiatives. It will create a unique LST program in collaboration with the BCTC, Toyota Motor Manufacturing North America, and a host of other industrial partners.
• Region: The program will provide the manufacturing industry within the Commonwealth a pool of highly trained, fundamentally sound, and motivated personnel, thereby ameliorating talent and skills shortages. It is envisioned to help encourage the founding or relocation of new businesses and manufacturing operations in the Commonwealth. Close collaboration between the UK COE and the BCTC will significantly strengthen Kentucky's workforce development and opportunities.

2. Describe how the student learning outcomes for the program will be assessed.

Graduates from the lean systems engineering technology program will demonstrate:
(PSLO 1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
(PSLO 2) an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
(PSLO 3) an ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
(PSLO 4) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
(PSLO 5) an ability to function effectively as a member as well as a leader on technical teams.

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3. Highlight any distinctive qualities of this proposed program.

The proposed BS in LST would be the only comprehensive lean systems engineering technology program in the nation. It will seek to create a synergy that comes from partnering with our community partners, the BCTC, and employers and industries to develop solutions for the critical skill shortages in manufacturing. It will focus on tackling the significant challenges confronting students and the Commonwealth of Kentucky for meeting manufacturing workforce needs. Among the unique features of the LST Program is the commitment among faculty to stress interdisciplinary collaboration and industrial engagement and to engage students and community partners in collaborative learning processes.
The Toyota Production System (TPS), sometimes referred to as a “lean manufacturing system” or a “Just-in-Time (JIT) system,” has come to be well known and studied worldwide. The BS in LST is the first comprehensive undergraduate program in the nation with TPS as its focus. It is developed in strong partnerships with UK, BCTC, and Toyota. It has the potential to make UK a leader in this area. The relationship between the UK Institute of Research for Technology Development’s Lean Systems Program (IR4TD-LSP) and the BS in LST program will make UK a center of excellence in Lean education and training.
Lean thinking has produced impressive?results for organizations?over a range of industries and sectors beyond manufacturing. These sectors include Government, Healthcare, Hospitality, food and beverage, among others.
The proposed program has the significant potential to help attract interdisciplinary faculty who are well-positioned to compete for extramural funding for research, instruction, and outreach programs with industrial partners.

4. Describe the admissions and graduation requirements for the program.

The proposed BS in LST is a feeder-completer program in a cooperative arrangement with the BCTC. The UK COE and BCTC shall cooperatively create the academic curriculum. The courses taken at both institutions meet their shared curricula requirements of an AAS in Integrated Engineering Technology (IET) from the BCTC and a BS in LST from UK. Together, the UK and BCTC will establish the infrastructure at UK and at BCTC that effectively enable students to fulfill their Engineering Technology degree requirements.
Both institutions will ensure that the program satisfies the admission and graduation requirements at each institution. It will facilitate a seamless transfer of credits between the UK and BCTC, and enable the development and implementation of a sequence of courses defined in the shared curricula at both the UK and BCTC.
Based on this academic structure, each institution shall grant a separate academic degree bearing its name and seal with appropriate signatures.
Admissions:
Students shall apply jointly to BCTC and UK, with BCTC becoming the home institution until students complete all requirements for an AAS degree in IET.? Students who complete their AAS degree requirements within a designated three-year period and who also meet the admission requirements as established by the UK COE, will not be required to reapply to the UK. After students are awarded their AAS from BCTC, UK would become their home institution

The UK catalog year for these students shall be based on the year in which each student was enrolled in the joint program.?

To be accepted to the joint UK/BCTC program, high school students must have an ACT math score of 23 or higher or the SAT equivalent of 570 or higher and an unweighted high school GPA of 2.5 or higher.

Students who are not initially admitted into the program may apply at a later date as a transfer student.

To be accepted into the joint UK/BCTC program, transfer students must have a minimum cumulative college GPA of 2.0 and have completed MA 109 or its equivalent with a grade of C or higher.

Students enrolled in the UK BS Engineering degree programs who decide to change majors from Engineering to Engineering Technology shall?consult with their academic advisor(s) and?follow the?process for a change in their major? as required by the?UK. These students must have a cumulative college GPA of 2.0 and may be required to complete some courses at BCTC?

Students enrolled in the?BCTC AAS degree who decide to change majors to AAS in IET?shall consult with their academic advisor(s) and follow the process for a change in their major as required by BCTC. Students must have a cumulative college GPA of 2.0.

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Retention
Student retention begins with each faculty member taking an active role in the education of each student. Hence, the LST faculty shall actively engage in teaching and, as needed, research activities with students to help maximize retention and graduation rates. An annual evaluation of each student's progress will be conducted by the Department and its faculty at the conclusion of each spring semester. The faculty will evaluate student progress and, if deemed necessary, recommend individualized remedial counseling for performance enhancement or maximization. The target retention rates in LST are to be at least 85% two years after acceptance and admission of the first students in the UK Department of Engineering Technology as juniors from BCTC and 93% three years after the admission of these students.
Probation:
Probation, suspension, and reinstatement will follow standard UK regulations as stated in Senate Rule 5.3.2.2
Graduation:
In addition to the graduation requirements listed in the UK Graduation Requirements Bulletin, to be awarded an LST Bachelor of Science degree, a student must:
1. complete the UK and COE requirements related to writing and the UK Core;
2. complete the required number of credit hours (127) exclusive of those earned in freshman college algebra and freshman college trigonometry, with a cumulative GPA standing of at least 2.0 on a 4.0 scale;
3. complete the requirements of the program;
4. complete a minimum of 24 credit hours of courses within the Engineering Technology Department at or above the 300 level;
5. complete all Engineering Technology Department courses and related technical electives with a cumulative GPA standing of 2.0 out of a possible 4.0 or higher and attain a grade of C or greater in each of these courses; and
6. successfully defend a senior design project in an oral presentation to both engineering and industry audiences.
Advising:

Program Advisor(s) for the BS LST Program and the COE Director of Student Records are to ensure and assist students' progression towards their degrees, and:
a. shall have access to and appropriate advising level permissions in both BCTC and UK information systems; and
b. shall meet the professional expectations and responsibilities within both the UK and BCTC.

5. Describe the administrative oversight to ensure the quality of the program.

The BS in LST program will be housed in a new department of Engineering Technology (ET) that will have a department Chair and a Director of Undergraduate Studies. They will provide oversight for the program.

The ET department will have an undergraduate curriculum committee that will conduct an assessment of the LST program every two years and prepare a report summarizing the results. The assessment report is submitted to the Department Chair and the department faculty. The Undergraduate Curriculum Committee will review the assessment report, decide if changes to the curriculum are required, and make recommendations to the faculty at department meetings. Proposed curriculum changes are discussed at department meetings and then approved and implemented as needed.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

NA

7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	127	50	9	

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

The proposed BS in LST will be the best choice for students who want to solve practical problems and who learn best when given extensive hands-on training and experiences. LST is the first program of its kind in the nation.

Secondly, the proposed program has a Math ACT Score requirement of 23, while all current engineering programs require a Math ACT Score 25. The LST program will target Kentucky High School students interested in engineering but do not meet the Math ACT Score of 25 requirements. Based on the historical applicant pool to the college, Fall 2011-Fall 2016 Cohorts, it is estimated that 465 students would be eligible to be admitted into the UK LST Program.

Finally, the proposed program will target engineering students who currently leave the COE before graduation. The second-year student fall retention rate in the college for Fall 2018 was 75.2%. Hence, 24.8% of, or 157 students left the COE by their second Fall semester. It is estimated that 50 of these students would have chosen or will choose the LST Program to stay in the UK COE. Their success is sought.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	10
2022-23	9	34
2023-24	23	86
2024-25	59	130
2025-26	66	145

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Continuous Improvements Engineers	77526	259	0.0	77629	111	0.0	79744	6108	0.0
Lean Manufacturing Specialists	99320	4	0.0	78591	2	0.0	77956	431	0.0
Manufacturing Production	40177	147	7.0	59274	88	4.0	43963	9294	9.0
Manufacturing Enginneers	71573	605	8.0	70897	377	11.0	71181	31330	8.0

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2b. Clearly describe evidence of employer demand.

Lean Systems Engineering Technologists are employed as Lean?Continuous Improvement engineers,?Lean Engineers,?Manufacturing?Engineers, Lean?Process Improvement?Engineers, Supplier Quality?Engineers, Lean Manufacturing Specialists, and Quality Engineers. They will be employed by industry, academia, and government labs for manufacturing and analysis

At the state level, Kentucky is home to 4,500 manufacturing facilities which employ over 251,910 manufacturing employees. In 2019, Kentucky-Made exports totaled over $33 billion, up from $31.16 billion in 2018. The manufacturing sector remains a primary focus for job creation and retention in Kentucky. With industry 4.0, multiple technology advances are converging and changing manufacturing industries and driven by an explosion in the volume of available data, developments in?analytics?and machine learning, new forms of human-machine interactions, intelligent robots, interconnected supply chains, and an ability to transmit digital instructions to the physical world. These complementary technologies can run smart, cost-efficient, and automated plants that produce large volumes or highly customized products. Concomitantly, increased knowledge, and technology skills are required on factory floors. For the Commonwealth to be prepared for the jobs of the future, we need to train and retain the next generations of our workforce to take on new challenges to start careers in modern manufacturing.

The Economic Modeling, LLC, (EMSI) conducted an engineering sector analysis in Kentucky for the Kentucky Council on Postsecondary Education (KY CPE, April 2020). The EMSI report identified Engineering Technology as an area of expansion at the bachelor's degree level within the Commonwealth of Kentucky. The report identifies a large gap existing in the following Engineering Technology area to help meet manufacturing job openings in the State:

• Manufacturing Engineering Technology: a 70% gap between annual job openings and yearly average CPE completions.
• Engineering Technology, General: a 57% gap between annual job openings and yearly average CPE completions.

The proposed program will enable UK to respond to a critical area for expansion at the bachelor's degree level and, in so doing, help the Commonwealth close these gaps.

At the regional level, the Southeast United States has some of the world's most advanced manufacturing companies in aerospace and automotive, and their parts and equipment suppliers.

At the national level, the Manufacturing Institute has been tracking skills shortages for the past 17 years. They have documented how skill shortages continue to swell and threaten to impede the current growth and productivity in the US manufacturing industry. In their November 14, 2018 report entitled "The jobs are here, but where are the people?", Deloitte and the Manufacturing Institute explored the depths of today's talent shortage in manufacturing and how jobs are changing due to technology and automation. They predicted a 53% shortage of skills in the US manufacturing industry by 2028.

Currently, no schools in the Southeast region schools have ABET ETAC-accredited programs in the Lean Systems Engineering Technology to support the advanced manufacturing workforce.

Also, the UK COE Career Development Office surveyed 200 employers who have recruited from the UK COE in recent years. Of the 200, 60 responded to the survey questions. These 60, 42.41% of the responders would hire BS Engineering Technology graduates from the UK if the program were offered.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

NA

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

The proposed Bachelor of Science in Lean Systems Engineering Technology program (BS-LST) will be the first of its kind in North America. The program prepares students with the knowledge and skills for a career advancing professional

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engineering technology within manufacturing technology fields, with an emphasis on Lean Manufacturing Engineering and Lean Operations Management. It includes Just-In-Time (JIT) manufacturing, problem-solving, project management, lean enterprise development, logistics, material and information flow charts (MIFC), and standardized work. The BS-LST graduates will have titles such as Lean?Continuous Improvement Engineer,?Lean Engineer,?Manufacturing?Engineer,? Lean?Process Improvement?Engineer, Supplier Quality?Engineer, Lean Manufacturing Specialist and Quality Engineer.

The Core Courses for the BS-LST include:

Introduction to Just-in-Time?Operations

Manufacturing Simulations, and Material and Information Flow Charts

Introduction to Abnormality Management (Jidoka)

Introduction to Productivity Improvement

System of Quality Assurance and Built-in-Quality

Kaizen of Standardized Work

Problem Solving

Production Instruction, Small Lot?Production and Change over Processes

Logistics

Managing the Shop Floor and Leading kaizen

The programs offered at Morehead State University (MSU) and Nothern Kentucky University (NKU) are distinctively different from what is proposed by the University of Kentucky. Below is a summary of the Bachelor of Science in Technology Management at Morehead State University and the Bachelor of Science in Mechatronics Engineering Technology:

Morehead State University BS in Technology

The Bachelor of Science in Technology Management (BSTM) at Morehead State University is an online completer degree program for people who have an associate degree in a technology-related field. The two-year program is offered completely online, allowing working professionals the convenience to earn a degree at their own pace. Students can choose between a technology systems option and an information systems option. The BSTM online completer program offers the scheduling flexibility that many working professionals require to complete a 120-hour bachelor’s degree with a blend of communication and technology.

Northern Kentucky University BS in Mechatronics Engineering Technology

The Bachelor of Science in Mechatronics Engineering Technology at Northern Kentucky University provides graduates real-world experiential education combined with personalized undergraduate experiences in mechanical, electrical and computer control systems, as well as engineering design and management. This Bachelor’s degree program is designed to provide students with the knowledge and skills needed to succeed as technological engineers in today’s highly integrated computer controlled manufacturing. Students are required to complete the core plus one track. A minor is not required. The target audience for the proposed BS-LST undergraduate program includes students seeking distinctive career paths

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opportunities in creative industrial design, production and service. Its focus and strengths will be students who learn best by visualizing concepts through hands-on practice by using the strengths of learning-by-doing, and who would thrive with an integrated education involving extensive industrial practicums and participation. Specific, targeted groups include:

(a) high school STEM majors considering careers in manufacturing as a lean?continuous improvement engineer,?lean engineer,?manufacturing?engineer, lean?process improvement?engineer, supplier quality?engineer, lean manufacturing specialist, and quality engineer;

(b) high-school students contemplating a career in engineering but who do not realize the myriad possibilities within or have not yet been exposed to Engineering Technology; and

(c) entering UK engineering students who are uncommitted to a particular field of engineering.

The collaborative UK and BCTC Program will also establish a unique path for students to attain a four-year BS degree in Engineering Technology and provide an attractive alternative for students who currently leave the UK-COE before graduating with their BS. Even though these targeted student population may overlap, the BS-LST provides a distinctive career pathway that is different from what both MSU and NKU offer.

Both Universities replied and did not think that they proposal program were duplicates

4b - How will the program support or be supported by other programs within the institution?

The proposed BS LST program will have shared facilities and some instructional laboratories with the Institute of Research for Technology's Lean Systems Program (IR4TD-LSP). IR4TD-LSP is a Toyota – UK Partnership since 1994, whose mission is to systematically explore, study?and teach the workings of the Toyota Production System (TPS), commonly known as Lean.?IR4TD-LSP supports other organizations in their transformation to True Lean™, and offer certification series to professional clients. The BS in LST will benefit substantially in collaborating with IR4TD-LSP.

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
Morehead State University	*Technology Management Area	53		50	14	29	7	27	5	32	6	34	4
Northern Kentucky University	*Mechatronics Engineering Technology	30		23	1	8		1					

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Full Proposal - Cost: Cost and Funding of the Proposed Program

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A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Na				
Total Resources Available from Other Non-State Sources					
New :	125000	225000	250000	275000	300000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	"Toyota Motor North America (TMNA) is donating $4.25 million to support the New ET Department as follows: 1) $2 million: Toyota Engineering Technology Diversity Scholarship 2) $1 million: Toyota Engineering Technology Distinguished Professorship 3) $1.25 million for Engineering Technology Laboratory Enhancement, faculty recruitment, and general expenses. This amount is shared between CPT and LST program, with LST portions included in new funding of $125K per year Also, faculty in the LST program will be engaged in activities with industry partners, through consulting services, lean implementation coaching, and applied research. These activities are estimated to generate income projected as follows: Yr2: $100K, increasing $25K yearly after that. "				
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	NA				
Internal					
Allocation :	600000	259591	58808	28469	190896
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :	The ET department will collaborate with the Institute of Research for Technology Development (IR4TD) and will share resources. IR4TD will make available $1.5 million for the creation of the ET department and the development and running of the CPT and LST degree program, with $615K allocated to the LST program. Note this amount carry-forward year to year until the original amount is spent and would not impact the financial solvency of IR4TD's other programs				
Student Tuition					
New :	38397	133350	289956	518109	583401
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	The tuition returns are calculated as follows: # of Student x{[$0.30 (25% NTR to ENG allocated on FTE + 75% NTR to ENG allocated on SCH)] + 60.24*24}				

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Total					
New :	$763,397	$617,941	$598,764	$821,578	$1,074,297
Existing :	$0	$0	$0	$0	$0
Total Funding Sources :	$763,397	$617,941	$598,764	$821,578	$1,074,297

B. Breakdown of Budget Expenses/Requirements	**1st year**	**2nd year**	**3rd year**	**4th year**	**5th year**
Staff: Executive, administrative, and managerial					
New :	14263	14548	14839	15136	15439
Existing :	0	0	0	0	0
Other Professional					
New :	205312	304668	310761	316976	323316
Existing :	0	0	0	0	0
Faculty					
New :	234232	238917	243695	248569	253541
Existing :	0	0	0	0	0
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Staff Includes 5% of Business Officer, and 3 Adminstrative Support positions currently housed within IR4TD. Also split with CPT and LST. These are expanded roles for IR4TD Staff Other professionals include new hires for Academic Advising at 50%, full time Lab Manager, and two Lecturer positions dedicated to LST One New Faculty Full Time Hire Dedicated to LST to Include two existing faculty currently on staff will be at 50% due to responsibities within IR4TD. One of these faculty will serve as DUS. The Department Chair is split 50% between CPT and LST				
Equipment and Instructional Materials					
New :	50000	1000	1000	50000	1000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Note $50K for initial equipment purchases - for maintenance and other needs in the following years				
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					

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Total					
New :	$503,807	$559,133	$570,295	$630,681	$593,296
Existing :	$0	$0	$0	$0	$0
Total Budget Expenses/Requirements :	$503,807	$559,133	$570,295	$630,681	$593,296

Grand Total					
Total Net Cost :	$259,590	$58,808	$28,469	$190,897	$481,001

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

Post-graduate success will be evaluated using alumni surveys. Each year, a detailed survey will be given to Program alumni to shed light on impressions, successes, or failures, and how the Engineering Technology Program has impacted their life and job opportunities. The survey questions will request information on their experiences since graduation and on perspectives for other cutting-edge educational experiences in which new and current LST students should be immersed. The alumni will also be asked to evaluate the importance of Engineering Technology, as well as their level of preparation for employment by the Program.

PROPOSED PROGRAM SUMMARY

Instituion: University of Louisville
Program Name: Computer Science
Degree Designation: BACHELOR OF ARTS (BA)
Degree Level : Baccalaureate

Program Description

The proposed Bachelor of Arts (BA) in Computer Science (CS) degree is in response to the existing need for technical jobs throughout the industry in Louisville and Kentucky as a whole. The structure of the program offers the students a chance not only to become well-equipped computer scientists but also to excel in other areas of studies that will match the students' interests. It will fulfill the demand in careers that rely on computer science and broad knowledge in application areas. The program is designed to be eight semesters long with two co-ops (or internships) in between. The credit hours of the program cover the required thirty-one credit general education requirements, two hours earned from the co-ops (internships), a minimum of fifty-seven hours in the field of computer science and an additional minimum of thirty hours in other areas of study (excluding business). Allowing students to choose other areas of studies that are not necessarily tied to sciences or engineering will make this degree attractive to students with leanings towards fields in liberal arts and the desire to work in a technically savvy industry. This degree should attract students directly from high schools, pre-engineering students, transfer students, and existing graduates with skills in other disciplines and a desire for a future in a technical career. The program is also designed to leverage the expertise and infrastructure in existence in the Department of Computer Science and Engineering (CSE).

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify

No.

CIP Code: 11.0701
Credit Hours: 120
Institutional Board Approval Date: 4/22/2021
Implementation Date: 8/23/2021

Student Demand

Year 1 - 40
Year 2 - 92
Year 3 - 146
Year 4 - 202
Year 5 - 229

Market Demand

Computer Science is changing every part of our lives, and it is not surprising that it is the number one source of all new wages in the U.S. economy. According to the U.S. Bureau of Labor Statistics, computing occupations constitute 58% of all projected new jobs in STEM fields based on their 2016-2026 employment projections, and currently there are more than 500,000 open computing jobs in the U.S. (Source: http://bit.ly/38OMyHK). This shortage is clearly reflected in H1B visa statistics as well, where 59% of H1B “skilled worker” visas were granted for computer science occupations in 2014, according to the U.S. Department of Labor, Office of Foreign Labor Certification (Source: http://bit.ly/2EmDonY).

In addition to the national shortage in a computing workforce, the local industry in Louisville also suffers from a tech shortage, based on a recent article published in Louisville Business First journal, the leading source for business news, data and networking for the Greater Louisville area (For more information, see: https://www.bizjournals.com/louisville/). In their June 28, 2019 article, editor David A. Mann interviewed local leading companies in the Louisville area to find out what they are doing to meet their tech needs in the Louisville region. The editor found out that according to KentuckianaWorks, a local workforce development company, there are about 2,750 tech job postings in Louisville, and the tech sector itself needs the most workers. In addition, Norton Healthcare Inc. stated in this interview that they need a major workforce in Louisville to develop apps and clinical technology, as well as maintain electronic medical records; however, the pool of resources within this region is shallow. GE Appliances, Kindred Healthcare LLC, Humana Inc., and Interapt LLC are among other Louisville-based companies who shared a similar view regarding the shortage in local tech talent. For more information and details, the full article can be accessed at: http://bit.ly/34udEke.

Unlike technical companies such as Google and Microsoft, which focus on the computing technology itself, many computer science related jobs in Louisville and elsewhere require the application of computer science skills into different fields. The proposed BACS program will fill this important void by providing students the opportunity to learn both computer science and another area of study where computer science has significant application. Compared to the current BS CSE program that focuses on the engineering and science application of computer science, the proposed BACS program targets the application of computer science in areas other than engineering and sciences, which are abundant in Louisville and elsewhere. In addition, the BACS program is expected to attract students from underrepresented groups, thus potentially increase the diversity in high-tech workforce in Louisville and beyond.

The proposed BACS program does not replace another program on campus.

Employment Demand

	Regional	State	National
Type Of Job	**Computer Network Architects**		
Avg. Wage	$83,282	$75,928	$109,020
# Jobs (Postings)	445	1265	12200
Expected Growth	11%	12%	5%
Type Of Job	**Computer Network Support Specialists**		

Avg. Wage	$58,016	$56,779	$62,770
# Jobs (Postings)	689	1354	17400
Expected Growth	10%	17%	6%
Type Of Job	**Computer Occupations, All Other**		
Avg. Wage	$77,329	$80,231	$90,270
# Jobs (Postings)	1333	2157	35700
Expected Growth	11%	11%	10%
Type Of Job	**Computer Systems Analysts**		
Avg. Wage	$73,904	$75,381	$88,740
# Jobs (Postings)	1693	3248	53400
Expected Growth	10%	11%	9%
Type Of Job	**Computer User Support Specialists**		
Avg. Wage	$44,496	$46,986	$50,980
# Jobs (Postings)	2440	4961	65100
Expected Growth	9%	16%	11%
Type Of Job	**Database Administrators**		
Avg. Wage	$85,970	$72,282	$90,070
# Jobs (Postings)	439	936	9700
Expected Growth	8%	15%	90%
Type Of Job	**Network and Computer Systems Administrators**		
Avg. Wage	$66,863	$63,644	$82,050
# Jobs (Postings)	941	2335	29300
Expected Growth	9%	7%	5%
Type Of Job	**Software Developers, Applications**		
Avg. Wage	$81,851	$80,322	$103,620
# Jobs (Postings)	3650	5567	99200
Expected Growth	23%	33%	26%
Type Of Job	**Software Developers, Systems Software**		
Avg. Wage	$86,020	$86,915	$110,000

# Jobs (Postings)	999	1835	35400
Expected Growth	15%	22%	10%
Type Of Job	**Web Developers**		
Avg. Wage	$69,431	$58,095	$69,430
# Jobs (Postings)	511	1218	15100
Expected Growth	10%	18%	13%

Indicate source of market demand information

Source (Regional - Louisville): KentuckianaWorks, Occupational Outlook for the Louisville Region, August 2019. (Time Frame: 2019-2029)
Source (State): Education and Workforce Development Cabinet, Kentucky Occupational Outlook to 2026, September 2018. (Time Frame: 2016-2026)
Source (National): Bureau of Labor Statistics, Employment Projections, Table 1.7. (Time Frame: 2018-2028)

Academic Demand

This is a program designed for students to enter the workforce directly after graduation. However, graduates from the BACS program will also be able to apply for graduate programs in the CSE Department such as the MS in CS, the graduate certificate in data science, and the graduate certificate in cybersecurity, as well as graduate computer science programs at other institutions. In addition, BACS graduates can apply for interdisciplinary programs that integrate computer science with another area of study.

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
2242	00197700	Murray State University	BA;BS	Computer Science	2015
11814	00197700	Murray State University	BS	Computer Science	

Comparison of Objectives/Focus/Curriculum to Similar Programs:
Murray State's Bachelor of Science degree in Computer Science is the only state program returned in our search by CIP from the CPE website. Murray State's computer science program is a Bachelor of Science degree program, which emphasizes scientific computing and problem solving. By comparison, the proposed BACS is a Bachelor of Art program, which emphasizes the computer science applications in areas other than science and engineering. Thus, the BACS program will provide students flexibility to study another area where computer science can be applied to. Also, the BACS program requires two co-ops (or interns) so that students can develop and improve their professional skills in applying computer science to solve real-life problems in the industrial setting.

Comparison of Student Populations:
Murray State's CS program targets students who are interested in scientific computing, which is similar to our current BS CSE program, which target the computing applications in both science and engineering. The BACS program, by comparison, targets students with interests in learning both compute science and other areas such as liberal arts.

Access to Existing Programs:
There is a documented shortage of tech workforce in Louisville and Kentucky, and our current BS CSE program cannot meet current student demand and graduate enough students in this area. There are about 200 pre-engineering students at UofL, as well as other students who like to study computer science but are not interested in a traditional engineering program with much emphasis on advanced math, science and engineering courses. The BACS program will provide opportunities for these students to study computer science and its applications. Also, as an urban university in the city of Louisville, UofL is uniquely positioned to attract populations who are financially unable to study at locations other than Louisville or who prefer to have co-op experiences that may not be available in other universities.

Feedback from Other Institutions:
The computer science cores are similar but with some differences as follows. The BACS program of UofL offers both C programming and object-oriented programming such as C++ and Java, while Murray State's curriculum focuses on C++ and other object-oriented programming. The BACS program teaches CSE 420 Design of Operating Systems, which is not in the Murray State's curriculum. The BACS program includes 6 CSE electives, which can be selected from a long list of computer science technical elective courses with breadth and depth that can leverage UofL School of Engineering's research strength and the integrated research and teaching in current and advanced topics in computer science.

Cost

Projected Revenue over Next Five Years ($) : 2947578
Projected Expenses over Next Five Years ($) : 2193937

Will Additional faculty be needed? Yes
The BACS students will take many of the same General Education and Computer Science courses as our current BS CSE students, and we expect that the increase of 40 BACS students estimated for the first year can be accommodated in those shared courses. However, for computer science courses that have lab sessions or are programming-intensive, we request 1 additional graduate teaching assistant (GTA) per year for Years 1 to 4, including stipend ($22,000/yr), tuition ($20,475/yr), and health insurance ($254.67/month). These GTAs will also help in additional class sections that are needed as the BACS enrollment increases.

With respect to 5 new courses to be developed for the BACS program, we request an amount of $40K (including $16K in Year 1, and $24K in Year 2) as x-pay to current faculty to

Provide a budgetary rationale for creating this new program
The Program Budget Spreadsheet shows that the program will generate a program surplus of $30,489 in its initial year, increasing to more than $723,000 totally for the subsequent four years.

Course Title (CIP)						
Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)						
Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-	Credit Hours	Existing (E) or New (N) Course
CSE	120	Introduction to Computer Science and Programming with Python	This course seeks to introduce fundamental computer science concepts through a mixture of information technology instruction and computational thinking, alongside the highly accessible programming language Python	C	3	N
CSE	110	Mathematical Foundations for Computer Science	The course covers mathematical and statistical concepts necessary for design and analysis of computer algorithms as well as developing system performance models, by visiting selected topics from number theory, vectors and matrices, combinatorics, probability, and statistics.	C	3	N
CSE	130	Intro to Programming Languages C/C++	Introduction to programming languages with C and C++. It includes laboratory exercises on the writing and compiling computer programs in C, C++.	C	3	E
CSE	220	OO Prog Design with Java	Introduction to Object Oriented Program design principal concepts and program development using Java programming language. It includes laboratory exercises on the design and implementation of computer applications in Java.	C	3	E
CSE	235	Computer Systems and Organization	This course provides an introduction to the fundamental concepts of computer systems by exploring how computer system execute programs and manipulate data, working from the C programming language down to the microprocessor. Topics covered include a tour of computer systems and hardware, advanced C programming techniques necessary to implement computer systems, data representation and manipulation techniques, and machine-level representation of programs in assembly language.	C	3	N
CSE	302	Data Structures	Study of information representations and relationship between the form of representation and processing techniques. Transformations between storage media. Referencing of information as related to the structure of its representation and implications for the design of the referencing language.	C	3	E
CSE	310	Discrete Structures	Engineering applications using computer structures including algebraic computational structures, finite state machines, relational structures, propositional logic, trees, graphs, groups, machine equivalence, introduction to formal grammar. Applications of these structures to engineering problems including fluid flow, communication systems, artificial intelligence, digital logic, and algorithm evaluation	C	3	E
CSE	335	Intro to Databases	This course is intended as an introduction to database management and programming for Computer Science students, both majors in the BS and BA degrees and minors. It covers the basics of SQL for database creation and querying, including procedural extensions and language bindings for database access through applications, and an introduction to database design.	C	3	E
CSE	350	Introduction to Software Engineering and Application Development	Software engineering is an engineered discipline in which the aim is the production of software products, delivered on time and within a set budget, that satisfies the client's needs. It covers all aspects of software production ranging from the early stage of product concept to design and implementation to post-delivery maintenance. This course introduces the major concept, techniques, and tools of software engineering so that students can prepare for their future IT and software careers. Moreover, through group curated projects, students can obtain hands-on experiences on entire phases and workflow of the software process	C	3	N
CSE	419	Introduction to Algorithms	This course covers an introduction to algorithms, spanning topics ranging from computational complexity to advanced tree and graph algorithms.	C	3	E
CSE	420	Design of Operating Systems	The course is designed to cover basic concepts of operating systems design and implementation including processe management, memory management, input/output and file management, storage management, distributed systems, and security.	C	3	E
CSE	470	Mobile Apps Design and Development	This course covers the basic concepts in designing and implementing applications running on Apple's iOS and Google's Android operating systems.	C	3	E
CSE	496	Capstone Design	This course requires solving a real-world design problem in computer engineering. It uses hardware and software design methods and tools learned in previous coursework emphasizing teamwork, written and oral communication.	C	3	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) Note: number recorded will automatically populate Core Hours in "Summary of Total Program Hours" table		39	NA

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable) Note: number recorded will automatically populate Program Option hours in "Summary of Total Program Hours" table		0	NA

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
CSE	5XX		A total of 4 required CSE electives	P	12	E
Varies	Other Area of Study		10 courses from other area of study such as biology, math, psychology, etc.	P	30	E
CSE/OAS			A total of 6 credit hours the student may choose from CSE electives or other area of studies	P	6	E
CSE	TBD	co-op/internship.	Workplace Experience as a co-op or internship	P	2	N
			# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table		50	NA

FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or	Credit Hours	Existing (E) or New (N) Course
			Students must complete 31 hours of General Education requirements. 12 of these hours are specified below. The rest are listed by category below			
ENG	101	Intro to College Writing I - WC	Students engage in critical thinking and writing by developing their writing processes and producing finished prose. Required writing consists of multiple drafts of 4-6 papers of varying lengths.	P	3	E
ENG	102	Intermediate College Writing II - WC	Students practice more sophisticated approaches to writing processes and products with an emphasis on how literacy functions in U.S. society, both with and outside of the academy. Additional emphasis on conducting primary and secondary research, generating longer texts, improving critical reading, and awareness of how diversity is reflected within literacy practices in U.S. society. Required writing consists of multiple drafts of at least four papers of varying lengths, with one extended documented paper.	P	3	E
MATH	180	Elements of Calculus - QR	Differential and integral calculus of polynomial, logarithmic, and exponential functions with applications. Note: Does not count toward mathematics major or minor.	P	3	E
COMM	111	Introduction to Public Speaking - OC	Training in fundamental processes and attributes of effective public speaking.	P	3	E
			Arts & Humanities (AH)		6	
			Social & Behavioral Sciences (SB) and Historical Perspective (SBH)		6	
			Natural Sciences (S, SL, B)		7	

Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)		Note: number recorded will automatically populate **Free Elective Hours** in "Summary of Total Program Hours" table	31	
	Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core	39	NA
		Required Program Options - Track/Concentration/Specialty Hours (if applicable	0	NA
		Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable	50	NA
		Free Elective Hours (i.e., general program electives) (if applicable	31	NA
		Total # of credit hours required for Program	120	NA
	Information to be completed by PIE Office			
		# of new courses		NA
		Total # of Courses (includes new and existing		NA
		Precentage of new courses (more than 25% may require SACS Substantive Change	#VALUE!	NA

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BA - BACHELOR OF ARTS
11.0701-Computer Science.
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Full Proposal - Basic Info

Institution :	University of Louisville
Program Type :	Single Institution
Program Name :	Computer Science
Degree Level :	Baccalaureate
Degree Designation :	BACHELOR OF ARTS
CIP Code (2-Digit) :	11-COMPUTER AND INFORMATION SCIENCES AND SUPPORT SERV
CIP Code :	11.0701-Computer Science.
Is this program an advanced-practice doctorate?	No
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	4/22/2021

Institutional Contact Information

First Name :	Leslie
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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

The proposed Bachelor of Arts (BA) in Computer Science (CS) degree is in response to the existing need for technical jobs throughout the industry in Louisville and Kentucky as a whole. The structure of the program offers the students a chance not only to become well-equipped computer scientists but also to excel in other areas of study that will match the students' interests. It will fulfill the demand in careers that rely on computer science and broad knowledge in application areas. The program is designed to be eight semesters long with two co-ops (or internships) in between. The credit hours of the program cover the required thirty-one credit general education requirements, two hours earned from the co-ops (internships), a minimum of fifty-seven hours in the field of computer science, and an additional minimum of thirty hours in other areas of study (OAS). Allowing students to choose other areas of study that are not necessarily tied to science or engineering will make this degree attractive to students who have leanings towards fields in liberal arts and the desire to work in a technically savvy industry. This degree should attract students directly from high schools, pre-engineering students, transfer students, and existing graduates with skills in other disciplines seeking to expand their knowledge and a future in a technical career. The program is also designed to leverage the expertise and infrastructure in existence in the Department of Computer Science and Engineering (CSE). The planned implementation date for this program is August 2021.

Does this program have any contentrations

No

2. Describe how the new program is consistent with the mission and goals of the institution.

Offering this degree will contribute to the university's mission by teaching an academically and professionally diverse undergraduate student body for the purpose of developing engaged and productive citizens and, thus, providing engaged service to improve the quality of life locally and globally. The program will attract groups of students who have a strong and parallel interest in fields other than computer science and will give them a chance to utilize some of the course work they may have already completed in computational applications. This education path coupled with the opportunity to move in a technologically desired direction will improve student retention. Specifically, the proposed degree will help implement some of the strategic actions stated in the university's 2019-2022 strategic plan, including "Attract and enroll a capable, diverse, and engaged student body responsive to the demographic and workforce needs of the future"; "Improve retention and persistence to graduation and ensure progress toward equal outcomes for underrepresented, underprepared, low-income student sub populations"; "Inspire a student-centered culture by improving the efficiency and user experience of our systems and the faculty and staff's responsible ownership of student success"; and "Create a high quality, industry-focused, core skills certification that students can use as an employment tool alongside their academic credential when they graduate." This will enhance the health and well-being of our citizens since it prepares these students to create and apply this newly acquired knowledge and excel in a global economy and culture.

4. Is there a specialized accrediting agency related to this program?

No

4a. If yes, identify accreditor:

4b. Will accreditation be sought?

No

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5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

6. Describe the rationale and need for the program to include how the institution determined need.

The rationale behind establishing the proposed Bachelor of Arts in Computer Science (BACS) degree program is responding to the computing workforce shortage existing locally and nationwide. This need was initially brought to our attention through our Industrial Advisory Board (IAB) members, including executive-members from UPS, Humana, and Yum Brands-KFC, where our IAB members mainly focus on the scientific and technological issues of their organizations. Subsequently, we analyzed the local job market and realized that there were about 2,750 open computing positions in Louisville alone. Furthermore, we studied the U.S. Bureau of Labor Statistics and discovered that computing occupations constituted 58% of all projected new jobs in STEM fields based on their 2016-2026 employment projections, and there were more than 500,000 open computing jobs in the U.S. Finally, we went through the H1B visa statistics and realized that 59% of the H1B “skilled worker” visa applications were granted for computer science occupations in 2014, according to the U.S. Department of Labor, Office of Foreign Labor Certification. Unlike technical companies such as Google and Microsoft, which focus on the computing technology itself, we observed that many computer science related jobs available locally and nationwide required the application of computer science skills into different fields. This was also confirmed in our IAB meetings as Humana was applying computer science to the health area while UPS was applying it to the logistics area. As a result, we designed the proposed BACS program with the goal of filling this important void locally and nationwide by providing students the opportunity to learn both computer science and another area of study where computer science has a significant application.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

This program is designed to provide the students a solid foundation and hands-on skills in computer science while allowing them to develop additional skills in other areas such as liberal arts, humanities, education, sciences, or business. This is consistent with the Speed School of Engineering's mission, which is to serve the University, the Commonwealth of Kentucky, and the engineering profession by providing high quality educational programs to all students. The proposed BACS program is built on the rigorous computer science courses of the ABET-accredited BS CSE program, while allowing students with different interests to study a broad range of electives from both computer science and other areas of study. The BACS program, through different admission requirements, will allow the Speed School of Engineering to serve a large number of academically diverse student populations, fulfilling our mission to provide high quality educational programs to all students. This is also consistent with UofL's mission of "teaching diverse undergraduate, graduate, and professional students in order to develop engaged citizens, leaders, and scholars." The
BACS students will master techniques in programming, data structures, algorithm design, software systems, computer applications, and database design and development, among others. They will be able to meet the technological needs of various industries, such as manufacturing, health care, and various service sectors, and become engaged citizens and leaders in their fields. With the widespread use of computer technology in virtually all aspects of our society, there is an increasing need for more computer science graduates with skills in both computing and application areas, as well as a correspondent need for a diversified computing workforce. The proposed BACS program can address both these societal needs by producing more BACS graduates among diverse student populations.

Graduates of the program will have an ability to:
1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
5. Apply computer science theory and software development fundamentals to produce computing-based solutions.
6. Apply computer science techniques and tools to solve problems in a chosen area of concentration.

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2. Describe how the student learning outcomes for the program will be assessed.

The student learning outcomes for the proposed BA in CS program are listed below.
Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
5. Apply computer science theory and software development fundamentals to produce computing-based solutions.
6. Apply computer science techniques and tools to solve problems in a chosen area of concentration.

Every outcome will be assessed by at least two courses, by both using direct measures such as exams, programming assignments, term projects, and capstone projects, as well as indirect measures including surveying students once per semester through the University of Louisville's online course evaluation system. The Undergraduate Curriculum Committee in the Department of Computer Science and Engineering will review the assessment and make recommendations for program improvement.

Student Learning Outcomes 1, 2, 5 will be assessed in CSE 302 through exams and programming assignments (direct), as well as surveys (indirect) once per year.

Student Learning Outcomes 1-6 will be assessed in CSE 350 through exams, term projects, and presentations (direct), as well as surveys (indirect) once per year.

Student Learning Outcomes 1-6 will be assessed in CSE 496 through the BACS capstone project and presentation (direct) and surveys (indirect) once per year.

3. Highlight any distinctive qualities of this proposed program.

The major qualities of the program are:
a. The computer science core is built on the ABET-accredited Computer Science and Engineering program offered by the CSE Department of the Speed School.
b. The program offers the flexibility of choosing other areas of study and a variety of computer science electives ranging from AI and data science to cybersecurity and software systems.
c. The remainder of the program credit hours allows for a highly customizable path that the students may follow to satisfy any additional requirements that will allow them to excel in any other area of study they choose.

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4. Describe the admissions and graduation requirements for the program.

Admission Requirements:
Admission into this program requires a high school GPA of 3.0 or above, an ACT composite score of 23 or above, and an ACT Mathematics score of 23 or above (SAT 560 or above). Students with fewer than 24 transferable semester hours can be accepted to the program if they meet these admission standards and have a minimum college GPA of 2.8. Students with 24 hours or more transferable semester hours must have a minimum college GPA of 2.8 and at least a B grade in Math 111. The program requires a minimum “C-” grade for any transferred course to be accepted as credit toward a degree.

Graduation Requirements: The BACS students must satisfy all university cardinal core requirements and complete all required courses and program requirements, a minimum of 120 earned credit hours, with at least 60 hours at a 4-year school. Students must have a cumulative university GPA of at least 2.25 and a cumulative program GPA of at least 2.25 and have neither missing nor outstanding “I” or “X” grades. Students must be formally recommended for the Bachelor of Arts degree in Computer Science by the J.B. Speed School of Engineering Faculty Assembly and by the Dean and must be approved for the degree by the Board of Trustees.

5. Describe the administrative oversight to ensure the quality of the program.

The University of Louisville is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC). As part of the SACSCOC accreditation requirement, we will collect student learning outcome (SLO) data annually on several BACS courses, including CSE 299, CSE 302, CSE 350, and CSE 399. The BACS program will have a CSE faculty member to serve as the program coordinator. The BACS coordinator will work with the department chair to periodically review BACS student learning outcomes and suggest changes to enhance the program. Also, the CSE Department has a curriculum committee. This committee will seek input from faculty and our industry advisory board to review the BACS curriculum and identify opportunities for continuous program enhancement. In addition, an annual survey will be conducted for students who are graduating from the BACS program, which will provide additional feedback for the department to assess and improve the BACS program and to ensure the quality.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Not applicable.

7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	120	39	50	31

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

According to the National Association of Colleges and Employers, computer science is the second highest paid college degree, just after mechatronic engineering graduates, and graduates studying computer science enjoyed the highest (76%) full-time employment rate in 2015. According to Horizon Media's WHY group survey, 50% of Americans rank computer science as one of the most important subjects to study. In addition, based on a study partnered by Gallup and Google, 91% of parents want their child to learn more computer science in the future; however, the National Center for Education Statistics (NCES) states that currently only 10% of STEM graduates study Computer Science. A summary of source data for all aforementioned statistics can be found at the following webpage: http://bit.ly/2YUgxcM. For student demand, faculty and staff relied on surveys performed by the National Center for Education Statistics available at the above source.

In addition, the BACS program can serve the pre-engineering students who are interested in learning computer science and meet our admission requirements. Based on available data in March 2020, among all the pre-engineering students who are admitted for the fall semester of 2020, 106 students have their composite and math ACT scores of 23 or above, and GPA of 3.0 or above, thus meeting the BACS admission requirements.

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	40
2022-23	0	92
2023-24	10	146
2024-25	20	202
2025-26	30	229

2. Employer Demand

Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Computer Network Architects	83282	445	11.0	75928	1265	12.2	109020	12200	5.3
Computer Network Support Specialists	58016	689	10.0	56779	1354	17.2	62770	17400	6.4
Computer Occupations, All Other	77329	1333	11.0	80231	2157	10.8	90270	35700	10.2
Computer Systems Analysts	73904	1693	10.0	75381	3248	10.5	88740	53400	8.8
Computer User Support Specialists	44496	2440	9.0	46986	4961	15.8	50980	65100	10.6
Database Administrators	85970	439	8.0	72282	936	14.5	90070	9700	9.0

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Network and Computer Systems Administrators	66863	941	9.0	63644	2335	6.8	82050	29300	4.7
Software Developers, Applications	81851	3650	23.0	80322	5567	33.4	103620	99200	25.6
Software Developers, Systems Software	86020	999	15.0	86915	1835	21.7	110000	35400	10.1
Web Developers	69431	511	10.0	58095	1218	17.8	69430	15100	13.0

2b. Clearly describe evidence of employer demand.

Evidence of employer demand is provided in the following links for regional, state, and national employers separately:

Regional (Louisville): KentuckianaWorks, Occupational Outlook for the Louisville Region, August 2019. (Time Frame: 2019 -2029).

There were 2,735 job posting in information technology in the second quarter of 2019 alone. In 2019, there were 3,650 jobs in software developers and applications that require a bachelor's degree for entry-level jobs, for which the BACS students would be a good match. In addition, there were 2,226 computer systems analysts, 1,333 computer occupations, 1,198 system software developers, 699 computer programmers, 590 database administrators, and 441 information security analyst jobs in 2019.

The BACS program will be able to graduate more students to meet the demands of those jobs available in Louisville alone. More details of the data can be seen at the following link.
o http://bit.ly/2TtJ9Zh

State (KY): Education and Workforce Development Cabinet, Kentucky Occupational Outlook to 2026, September 2018. (Time Frame: 2016-2026).

The Commonwealth of Kentucky predicts a 14.9% increase of Computer and Information Systems Managers jobs, and 15.9% increase of all computer occupations in Kentucky, including computer systems analysts, computer programmers, software developers, application developers, system software developers, web developers, database administrators, etc. Given that UofL has many in-state students, the BACS program may benefit the Commonwealth of Kentucky in general, and Louisville in particular. More state data can be seen at the following link.
o http://bit.ly/2wExbD6

National: Bureau of Labor Statistics, Employment Projections, Table 1.7. (Time Frame: 2018-2028).

The BoLS data indicates that the national growth of software and application developer jobs is expected to be 25.6%, which is significantly higher than all other computer occupations. Therefore, there will be significant employer demand of BACS graduates national-wide. More national data can be seen at the following link.
o http://bit.ly/3cCkwBo

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

This program is not being proposed due to academic disciplinary needs.

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

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4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

A BA in Computer Science (CS) program does not exist at public institutions in Kentucky. If approved, the University of Louisville will be the first institution offering this program at Kentucky.

The proposed BACS program is sufficiently different from the existing CS programs offered by state institutions in Kentucky. For example, compared to Murray State's BS CS program, which emphasizes scientific computing and problem solving, the BACS we propose is a Bachelor of Arts program, which emphasizes the computer science applications in areas other than science and engineering. Thus, the BACS program will provide students flexibility to study another area where computer science can be applied to. Also, the BACS program requires two co-ops (or interns) so that students can develop and improve their professional skills in applying computer science to solve real-life problems in the industrial setting.

Murray State's computer science program is a Bachelor of Science degree program in the college of business, which offers two tracks in Game Development and Data Science respectively. By comparison, the proposed BACS is a Bachelor of Arts program in the Speed School of Engineering, which emphasizes both the computer science theory and applications. The core computer science courses in our BACS program are mostly based on the computer science courses in our existing ABET-accredited BS in Computer Science and Engineering program, which provides students both breadth and depth in computer science, while enabling them to study another area where computer science can be applied to. Also, as part of our engineering school tradition, the BACS program requires two coops (or interns) so that students can develop and improve their professional skills in applying computer science to solve real-life problems in the industrial setting. In addition, the BACS program requires a capstone design project for senior students, while the Murray State program does not seem to require.

Murray State's CS program targets business school students who are interested in computer science and its applications in business. The BACS program, by comparison, targets students with interests in learning both computer science and other areas such as liberal arts. As a regional university, Murray State targets different student population from University of Louisville. For example, Murray State admits students with a high school GPA of 2.0 - 2.99 with an ACT composite score of 18 or higher. By comparison, the BACS program requires a high school GPA of 3.0 or above and an ACT composite score of 23 or above. Moreover, the BACS program will be offered fully online in one year after its creation, allowing us to serve non-traditional students in Kentucky or other states to study computer science or complete their degrees at their own pace.

There is a documented shortage of tech workforce in Louisville and Kentucky, and our current BS CSE program cannot meet current student demand and graduate enough students in this area. There are about 200 pre-engineering students at UofL, as well as other students who like to study computer science but are not interested in a traditional engineering program that emphasizes advanced math, science, and engineering courses. The BACS program will provide opportunities for these students to study computer science and its applications. Also, as an urban university in the city of Louisville, UofL is uniquely positioned to attract populations who are financially unable to study at locations other than Louisville or who prefer to have co-op experiences that may not be available in other universities.

Computer Science Department Chairs Dr. Wei Zhang of UofL and Dr. Victor Raj of Murray State had a chance to discuss the similarities and differences between the two programs via email. The computer science cores are similar but with some differences as follows. The BACS program of UofL offers both C programming and object-oriented programming such as C ++ and Java, while Murray State's curriculum focuses on C++ and other object-oriented programming. The BACS program teaches CSE 420 Design of Operating Systems, which is not in the Murray State's curriculum. The BACS program includes 6 CSE electives, which can be selected from a long list of computer science technical elective courses with breadth and depth that can leverage UofL School of Engineering's research strength and the integrated research and teaching in current and advanced topics in computer science. In his final email, Dr. Raj said "We have no objection to the new program at UL. All the best!"

4b - How will the program support or be supported by other programs within the institution?

The existing Bachelor of Science in Computer Science and Engineering program will support this program, as many of the courses will be the same.

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4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
Murray State University	Computer Science	142		124	18	136	27	120	20	139	18	141	17

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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Internal					
Allocation :	0	0	0	0	0
Reallocation :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Tuition					
New :	117720	333540	587946	878976	1029396
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	See the Full Proposal for a breakdown of student enrollment projections for new and existing students. We are estimating revenue to the unit based on the total number of additional students to the university x the CSE credit hours per year to be taught in the Speed School x $327 per credit hour, which is the projected revenue to units for FY21. Note that $327/credit hour to SSoE is derived based on the fact that the undergraduate resident tuition rate is $489 per credit hour and 70% (net of mandatory student fees) of resident per credit hour tuition rate charged to undergraduate students is allocated to the academic unit where the instruction takes place.				
Total					
New :	$117,720	$333,540	$587,946	$878,976	$1,029,396
Existing :	$0	$0	$0	$0	$0
Total Funding Sources :	$117,720	$333,540	$587,946	$878,976	$1,029,396

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Other Professional					
New :	25700	116421	117215	118033	118876
Existing :	0	0	0	0	0
Faculty					
New :	0	102800	211768	347630	358059
Existing :	16000	16000	8000	0	0
Graduate Assistants (if master's or doctorate)					
New :	45531	91062	136593	182124	182124
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Equipment and Instructional Materials					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	To support the BACS program, we request to have 1 new term faculty in Year 2 and Year 3, respectively, and 1 tenure-track faculty at Year 4. The term faculty's base salary is $80K/year, with 28.5% fringe benefits and 3% annual raise. The tenure-track faculty's base salary is $95K/year, with 28.5% fringe benefits and 3% annual raise. To support the recruiting and advising efforts for BACS students, we also request to add three Academic and Student Affair (ASA) staff members, including a 50% recruiter in Year 1, a 100% academic advisor in Year 2, and a 75% co-op advisor in Year 1, all of which are budgeted with a base salary of $40K/year, 28.5% fringe benefits and 3% annual raise. In addition, we request 1 graduate teaching assistant (GTA) per year for the first 4 years. Each GTA includes a base stipend of $22K/year, $20,476 tuition/year, and $254.67/month for the health insurance. To compensate faculty's time to develop 5 new courses for the BACS program, we also request $40K budget for new course development ($8K/course).				
Library					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					

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Total					
New :	$71,231	$310,283	$465,576	$647,787	$659,059
Existing :	$16,000	$16,000	$8,000	$0	$0
Total Budget Expenses/Requirements :	$87,231	$326,283	$473,576	$647,787	$659,059

Grand Total					
Total Net Cost :	$30,489	$7,257	$114,370	$231,189	$370,337

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Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

The program will track post-graduate activities of students throughout an exit interview and by using the Alumni Association's data. Upon identifying the career choices made by the graduates, the program will focus on:
• The relevance of the program contents to the jobs and tasks undertaken by the graduates.
• The correlation between the needs of the commonwealth and the skills obtained by the graduates throughout their education process.
• The degree by which the program contents made the alumni attractive to the local economy and industries.
• The extent by which program contents facilitated attractive employment to our graduates.

The data will be collected through surveying the graduates, employers, and academic advisors. The program will establish an advisory board of industry and community leaders to assess program success and to recommend changes and improvements to keep the program relevant to the Commonwealth of Kentucky.

PROPOSED PROGRAM SUMMARY

Instituion: University of Louisville
Program Name: Doctor of Social Work
Degree Designation: Doctor of Social Work (DSW)
Degree Level : Doctor's Degree Professional Practice

Program Description

To meet the needs of Kentucky's social work workforce and the aspirational goals of students seeking advanced social work degrees in the state, the nation, and abroad, this proposal requests to expand the degree offerings at the Kent School of Social Work (Kent School) with the Doctorate in Social Work (DSW).

The DSW is a "practice doctorate degree [and it] is intended to prepare social workers to assume advanced professional roles such as master practitioner, educator, administrator, policy practitioner, or leader in settings where social workers practice." The DSW degree program will educate social workers holding a master's degree with at least two years of post-Master's experience to become future practitioner scholars in teaching and social service leadership. A practitioner scholar is an individual who is academically trained in methods of scientific inquiry and social work best practices and equipped with leadership and teaching skills to be a bridge and navigate within and between the academic and social service settings as an educator and/or leader. A practitioner scholar is focused on critically examining and applying social work knowledge to implement innovative and just practices to promote organizational and community change.

As graduates of the DSW degree program, practitioner scholars will be instilled with 1) the belief and value of engaging in lifelong learning, 2) a trauma-informed, anti-oppressive, "learning organization" perspective to understand and enact change in social service organizations/settings, 3) theories, methods, and principles of adult learning, and of equity, fairness, and justice, and 4) advanced skills in assessing, implementing, and evaluating social work practices to motivate, teach, instruct, train, and lead for the betterment of social work practitioners, employees, social work students, and clients who are ultimately served (e.g., individuals seeking to manage behavioral health issues, families struggling with parenting, non-profit organizations managing change).

The overall goal of the DSW degree program is to offer advanced education, training, and mentoring to social workers holding a master's degree with at least two years of post-Master's experience who wish to become social work teaching faculty or leaders in public or private social service organizations throughout Kentucky, the nation, and abroad.

The DSW is a 44-credit hour, 100% fully online degree program taught through synchronous & asynchronous models, with no on-campus residency requirements. It can be completed in 8 semesters (three years), including continuous enrollment during the summer. It is designed for currently employed master-degreed social workers for whom it is not feasible to interrupt their employment to pursue doctoral education full-time but who, nevertheless, desire to have greater opportunity to advance into social service leadership and college/university teaching positions through advanced

academic training, credentialing, and mentorship with the convenience and flexibility of a fully online program.

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
This is a new program and it does not replace or enhance any existing program(s) or tracks, concentrations, or specializations within an existing program.

CIP Code: 44.0701
Credit Hours: 44
Institutional Board Approval Date: 4/22/2021
Implementation Date: 8/23/2021

Student Demand

Year 1 - 10
Year 2 - 20
Year 3 - 20
Year 4 - 20
Year 5 - 20

Market Demand

This new program that does not replace another program on campus. It is needed because nationally interest in and the establishment of the Doctorate in Social Work (DSW) as a degree option continues to grow nationally. The latest data indicates that enrollment increased annually by 34.4% from 2017 to 2018, and the number of programs has increased by 37.5% for the same time period2. In comparison, from 2017 to 2018, there was a 6.8% increase in social work PhD enrollment and 2.6% increase in the number of accredited programs. Though social work PhD enrollment did increase from 2017 to 2018, enrollment has declined for the rest of the 10-year period examined (2008 to 2018) for doctoral programs in social work.

In Kentucky, both the University of Kentucky and Spalding University began to offer a DSW degree in Fall 2020. Regionally, the University of Tennessee has had a DSW degree alongside its PhD program for several years. Nationally, there are 18 existing programs sprinkled throughout the country, on the Westcoast (e.g., California) and in the Midwest (e.g., Minnesota), Northeast (e.g., NY, NJ, Pennsylvania), and South (e.g., Florida).

According to the Bureau of Labor Statistics, there are 682,100 Social Worker jobs in the US. Social worker employment is expected to grow 16% between 2016 and 2026 - a much faster rate than the average growth rate (8%) across all careers in the US. PhD and DSW professionals earn $20-$25,000 more than MSWs and $38,000+ more than BSW professionals (National Social Work Workforce Study, 2017). Labor Insight (2019) ranked jobs and positions seeking a DSW as the 9th most sought after in the Commonwealth and 16th in the nation.

Entities hiring DSW graduates include universities, government agencies, non-profit

agencies, and consulting firms. Jobs requiring or encouraging a doctorate degree include private clinical practice, faculty, academic administration, consulting, non-academic administration, and high-level program or systems management. Skills in demand (aligned with a doctorate degree) include academic instruction, supervision, policy analysis, curriculum development, and community programs development3. Although practice doctorate (DSW) graduates are primarily going into non-academic administrative positions (22.9% of graduates) and private clinical practice (17.7%); tenure-track faculty positions at CSWE-accredited programs (15.6%) and non-tenure-track faculty positions at CSWE-accredited programs (12.5%) are also first destinations.

A market feasibility report on online practice doctorates in social work prepared by UofL's Delphi Center for Teaching and Learning in January 20203 for the Kent School concluded: "the growth in demand for a social work doctorate education is increasing rapidly and more schools are offering or preparing to offer such a degree (University of Kentucky will be the main competitor in Kentucky). Based on the available industry data, competitor comparison and demand indicators, we recommend that UofL's Kent School of Social Work offer an online DSW degree" (p.1-2).

In designing the DSW program, we have included many of the recommendations from the market feasibility report. Our proposed program will have a national and international reach. Our program will be quite competitive, as it includes many of the aspects of interest to potential applicants that are offered in other programs (e.g., 100% online—of the current 18 DSW programs nationwide, only 5 are totally online) and is designed to address barriers of access and flexibility. Our program will train practitioner scholars in teaching and social service/ organizational leadership; a focus that only half of the existing programs emphasize. Our tuition rate per credit hour ($764) is within the median tuition rate ($800) per credit hour of existing programs. Our program will take three years to complete, which is comparable to the majority (n=13) of the existing DSW programs. Our proposal is unique in that it offers 8-week terms. Our program is fully online, utilizing both synchronous and asynchronous models of instruction without on-campus orientation or residency as a requirement. Additionally, students obtaining the DSW at the Kent School will have the advantage of earning an advanced degree from an R1 public institution.

Our program is distinct from the regional programs (University of Kentucky, Spalding University, and University of Tennessee) for its focus, required number of credit hours, being geared towards the working professional, sequentially placed and offered courses, and having the option for completing either a thesis or a capstone project. Our program is the only one that focuses on training teachers and organizational (specific to social service) leaders.

Employment Demand

	Regional	State	National
Type Of Job	**Head of Social Service Agency**		
Avg. Wage	$64,498	$61,810	$72,900
# Jobs (Postings)	1460	260	17800
Expected Growth	13%	14%	13%
Type Of Job	**University Faculty**		
Avg. Wage	$67,794	$64,450	$78,320
# Jobs (Postings)	100	10	1500
Expected Growth	4%	7%	8%

Indicate source of market demand information

Occupational Employment Statistics Query System, May 2019, U.S. Bureau of Labor Statistics.
www.projectionscentral.com (State Occupational Projections)

Academic Demand

This program is designed for students to enter the workforce immediately after graduation.

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
14934	00198900	University of Kentucky	DSW	Social Work, DSW	

Comparison of Objectives/Focus/Curriculum to Similar Programs:
The main difference is that our program focuses on teaching in addition to social service organizational leadership. Our method of delivery is accelerated, and sequential offering of courses allows for greater flexibility for the working professional to advance their career goals.

Comparison of Student Populations:
There will be some overlap in both programs in target student population, as both programs will be targeting students interested in leadership. However, because our program is for the working professional and UK's program is full-time, our target student population will be different.

Access to Existing Programs:
Our program is focused on reaching the professional working in agencies/organizations as well those teaching in social work programs. UK's program does not specify a focus in these areas and thus would not be responsive to this student population.

Feedback from Other Institutions:
While several attempts have been made to gather feedback on the proposed program from UK, we have received no response.

Cost

Projected Revenue over Next Five Years ($) : 1792755
Projected Expenses over Next Five Years ($) : 1290000

Will Additional faculty be needed? Yes
Two new full-time term faculty and one new part-time faculty will be hired to teach in the DSW program. The two new full-time term faculty will be hired to start the program. The part-time faculty member will not be needed until year 3 of the program. A currently tenured faculty member will serve as interim director of the program until the program director, one of these new hires, is appointed. The director will receive a 25% workload reduction to serve in this role. A half-time program assistant will be provided for administrative and logistical support.

This new program will not impact current faculty workload. Current faculty could opt to teach a course or two in this new program and could offer to serve on thesis/capstone committees of DSW students. Currently, the school has a me

Provide a budgetary rationale for creating this new program
This program will generate new tuition dollars, increase revenue by attracting a new pool of students, meet employment needs in the state; and add to the pool of graduates that have been shown to be beneficial to the economic needs of the state.

Course Title (CIP)						
Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)						
Course Prefix	**Course #**	**Course Title**	**Course Description**	**Type of Course: program core (C) or pre-major/ pre-professional (P)**	**Credit Hours**	**Existing (E) or New (N) Course**
SW	800	Social Service Leadership and Teachng & Learning: History, Philosophy & Current Practice	This course introduces students to the study of social service leadership and teaching and learning by examining their associated philosophical and social work roots. Topic covered include historical influences on current social service systems and social work education specific to policies and practices, structures, and processes. Current models of practice are examined in light of historical and philosophical influences.	C	3	N
SW	801	Ethics, Equity, and Social Justice: Theory & Practice	This course focuses on the theoretical, social, and historical foundations of ethics, equity, and social justice in relation to issues in social service leadership and social work teaching and learning. Topics to be covered include systems of oppression, interpersonal and systemic discrimination, and unequal distribution and access to power and resources as well as how to create a healthy and inclusive culture and climate in which all employees and those being served can thrive and reach positive outcomes. Students will have the opportunity to challenge dominant structures and practices that further social injustice and oppression. They will evaluate existing and proposed strategies to redress systemic barriers to equality and inclusiveness.	C	3	N
SW	802	Research Methods	This course focuses on scientific inquiry and understanding of basic research methods including design and research ethics. Students will learn to research and review the literature in a systematic manner, critically appraise research studies for rigor, significance, and relevance. They will apply this knowledge to researching and assessing evidence for practice change, particularly efficacy studies regarding interventions, practices, and programs as they relate to informing teaching and social service leadership.	C	3	N
SW	803	Program Evaluation	This course will provide students with the knowledge and skills for conducting program evaluation and assessment in academic and social service settings. Students will be introduced to program evaluation concepts and methods, skills for designing, implementing and interpreting program evaluations, and using of evaluation findings for initiating improvements and changing programs and practices in academic and social service settings.	C	3	N
SW	804	Implementation Science, Program Development, & Administration	This course aims to enhance students' understanding of implementation science, and its application to program development and administration. Course topics include methods and strategies that facilitate the use of evidence based practice and research in practice and policy-making, identifying and addressing the barriers that impede adoption of interventions and evidence based practices, and identifying key measures to evaluate successful implementation of evidence based practices.	C	3	N
SW	805	Continuous Quality Improvement, Data Driven Decision-Making, and Evidence Based Practice and Management	This course focuses on continuous quality improvement (CQI) process, data driven decision-making, and promotion of evidence based practice and management. Topics covered include data literacy, applying the most appropriate data for decision making for effective leadership and management, communicating with data and data visualization.	C	3	N
	806	Applied Social Service Leadership, Management & Practice	With the lens of administrative practice within the organization, and boundary spanning in the community and advocacy practice, students will be trained on problem based learning approaches in order to apply them to challenging leadership and management issues in academic and social service settings. Students complete a leadership practicum as a required component of this course. Students apply and integrate leadership knowledge and skills gained and developed through the coursework in a social service setting. Tasks covered include strategic planning, strategies for engaging clients, developing and implementing for workforce retention, setting up a volunteer program, fundraising, grant writing, budgeting, and cost-benefit analysis. It also includes directing needs assessment, developing a plan for implementing evidence based practices, instituting and evaluating a training and professional development plan for employees, directing and Initiating program evaluation, conducting a readiness for change assessment of the organization, and utilizing information management systems and existing data inform decision making.	C	4	N
SW	807	Program Planning, Finance and Budgets	The focus of this course is on program planning, administration, and management within the context of social work values and ethics. Students will also review various sources of funding and strategies for securing funding via grant writing, as well as gain knowledge of writing and submitting grant proposals.	C	3	N
SW	808	Social Work Teaching & Learning: Theories, Methods & Assessmen	This course explores theories and methods of teaching and adult learning in the classroom and online, course and curriculum development within the context of accreditation policies and guidelines, and student assessments and course evaluations. Students critically analyze theories and their applicability to the classroom, learners, and their fit with their developed teaching philosophy and preferred teaching methods.	C	3	N
SW	809	Teaching in Social Work: Course Design, Instruction & E	Students apply theories and methods of teaching in the classroom and online, develop lesson plans, demonstrate use of best practices in instructional techniques and strategies, integration of technology into lesson plans, and classroom management. Students assess their own teaching and are also assessed on their teaching ability and provided feedback to enhance their teaching and instruction. Students complete a teach practicum as a required component of this course.	C	4	N
SW	810	Policy Analysis & Advocacy: Contemporary Issues	Critical examination of contemporary policies and practices in social service leadership and teaching & learning are undertaken from an equity, fairness, and justice perspectives. Students critique policies, develop advocacy plans and strategies for correcting inequities, promoting and sustaining fair and just practices in academic and social service settings.	C	3	N
SW	811	Integrative Seminar & Qualifying Assessment	Students will be guided to integrate the coursework completed and develop a concept paper for their thesis or capstone project. This concept paper serves as a qualifying assessment of the student's readiness to move onto the thesis or capstone project. The processes for setting up thesis/capstone project committees will be discussed, and requirements for successful completion of thesis/capstone project will be reviewed.	C	3	N
SW	812	Thesis/Capstone project	Students will complete an original thesis or capstone project under the supervision of a faculty member/mentor and three other faculty members (one of which is from outside of the school) and disseminate its findings to the appropriate broader academic and/or social service community.	C	6	N
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core)	**Note: number**	**44**	**NA**

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable)				Note:	0	NA
GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table			NA
FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
			Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable)		0	NA
		Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)		44	NA
			Required Program Options - Track/Concentration/Specialty Hours (if applicable)		0	NA
			Guided Elective Hours (e.g., focused or track/concentration/speciality area specific electives) (if applicable)		0	NA
			Free Elective Hours (i.e., general program electives) (if applicable)		0	NA
			Total # of credit hours required for Program		44	NA
		Information to be completed by PIE Office				
			# of new courses			NA
			Total # of Courses (includes new and existing)			NA
			Precentage of new courses (more than 25% may require SACS Substantive Change)		#VALUE!	NA

University of Louisville
DSW - Doctor of Social Work
44.0701-Social Work.
Submission Date: 04/20/2021 10:38

Full Proposal - Basic Info

Institution :	University of Louisville
Program Type :	Single Institution
Program Name :	Doctor of Social Work
Degree Level :	Doctor's Degree Professional Practice
Degree Designation :	Doctor of Social Work
CIP Code (2-Digit) :	44-PUBLIC ADMINISTRATION AND SOCIAL SERVICE PROFESSIO
CIP Code :	44.0701-Social Work.
Is this program an advanced-practice doctorate?	Yes
Program Type:	Single Institution
Implementation Date:	8/1/2021 12:00:00 AM
Intended Date of Implementation :	8/1/2021
Date of Governing Board Approval :	4/22/2021

Institutional Contact Information

First Name :	Leslie
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University of Louisville
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Full Proposal - Overview

1. Provide a brief description of the program with its estimated date of implementation.

To meet the needs of Kentucky's social work workforce and the aspirational goals of students seeking advanced social work degrees in the state, the nation, and abroad, this proposal requests to expand the degree offerings at the Kent School of Social Work (Kent School) with the Doctorate in Social Work (DSW) in addition to the current offerings of the BSW, MSSW, MSCFT, and PhD degrees.

The DSW is a "practice doctorate degree [and] is intended to prepare social workers to assume advanced professional roles such as master practitioner, educator, administrator, policy practitioner, or leader in settings where social workers practice." The DSW degree program will educate social workers holding a master's degree with at least two years of post-master's experience to become future practitioner scholars in teaching and social service leadership. A practitioner scholar is an individual who is academically trained in methods of scientific inquiry and social work best practices and equipped with leadership and teaching skills to be a bridge and navigate within and between the academic and social service settings as an educator and/or leader. A practitioner scholar is focused on critically examining and applying social work knowledge to implement innovative and just practices to promote organizational and community change.

As a graduate of the DSW degree program, practitioner scholars will be instilled with 1) the belief and value of engaging in lifelong learning, 2) a trauma-informed, anti-oppressive, "learning organization" perspective to understand and enact change in social service organizations/settings, 3) theories, methods, and principles of adult learning, and of equity, fairness, and justice, and 4) advanced skills in assessing, implementing, and evaluating social work practices to motivate, teach, instruct, train, and lead for the betterment of social work practitioners, employees, social work students, and clients who are ultimately served (e.g., individuals seeking to manage behavioral health issues, families struggling with parenting, nonprofit organizations managing change).

The overall goal of the DSW degree program is to offer advanced education, training, and mentoring to social workers holding a master's degree with at least two years of post-master's experience who wish to become social work teaching faculty or leaders in public or private social service organizations throughout Kentucky, the nation, and abroad. The program will equip students with both leadership and teaching skills via the proposed integrated curriculum so that graduates will be able to assume either or both social service leadership and teaching faculty positions.

The DSW is structured to be a 44-credit hour, 100% fully online degree program taught through synchronous & asynchronous models (with no on-campus residency requirements) that can be completed in 8 semesters (three years), including continuous enrollment during the summer. It is designed for currently employed master degreed social workers for whom it is not feasible to interrupt their employment to pursue doctoral education full-time but who, nevertheless, desire to have greater opportunity to advance into social service leadership and college/university teaching positions. With our focus on recruiting the working professional, this program is designed to be part-time (6-credit hours each semester), and thus is a non-scholarship awarding program, similar to almost all other DSW programs. The planned implementation date is August 2021.

Does this program have any contentrations

No

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2. Describe how the new program is consistent with the mission and goals of the institution.

To achieve its overall mission, the University of Louisville in part "pursues excellence and inclusiveness in its work to educate and serve its community through teaching diverse undergraduate, graduate and professional students in order to develop engaged citizens, leaders and scholars" (p.6, University of Louisville 2019-2022 Strategic Plan) through its strategic plan focusing on making UofL a great place to learn, work, and invest. Likewise, the mission of the Kent School of Social Work is to address complex social problems through education, research, and service to create a just and better world.

The proposed DSW program has the goal of being an exemplar of making UofL a great place to learn as well meeting Kent School's mission by teaching DSW students to critically examine models and methods of leadership and teaching and use research findings to enhance practice in order to create a just and better world. The DSW program will aim to attract, enroll, and graduate a talented and diverse set of students to meet the workforce needs of the future (Strategy L1, UofL 2019-2022 Strategic Plan) by engaging online and adult learners in course and program offerings. This assertion is supported by our marketing research that indicates that there is a diverse pool of applicants interested in pursuing the DSW to become practitioner scholars in teaching and social service leadership.

The DSW will be the first doctoral degree to be offered fully online at UofL. Graduates from the DSW program will have the knowledge and skills to fill current gaps in teaching and leadership positions locally, statewide, around the U.S., and abroad. Offering this degree will further strengthen Kent School's existing ties with local, state, and national social service organizations. It will bolster the University's reputation and prominence in the local social service community as well as across the nation and world with its well-prepared graduates and its curriculum sequentially designed to meet the needs of the workforce.

The DSW degree program also fulfills strategic goals within Kent School of Social Work by increasing the number of graduate degrees conferred and having a full complement of degree offerings to be competitive with both private (Spalding University) and public (University of Kentucky) social work programs in Kentucky. Finally, the program has the potential to be synergetic, as many of the students are expected to be working in agencies. Thus, it affords the opportunity to build stronger partnerships between social service organizations, Kent School, and the University. There is also the potential for increased community engagement and community engaged scholarship, which are in line with UofL's and Kent School's strategic goals.

4. Is there a specialized accrediting agency related to this program?

Yes

4a. If yes, identify accreditor:

Council on Social Work Education

4b. Will accreditation be sought?

Yes

5. Does this program have a clinical component?

No

5a. If yes, discuss the nature, appropiateness, and availability of clinical sites:

This program does not have a clinical component.

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6. Describe the rationale and need for the program to include how the institution determined need.

There is a need for increase participation in postsecondary education, particularly among traditionally underserved populations by expanding the availability of flexible, affordable, competency-based postsecondary programs in Kentucky. The 100% online offering of the DSW allows greater opportunity and accessibility for all residents of Kentucky, particularly social work professionals who live outside of Metro Louisville and all social work professionals who want to advance their education in order to advance their career opportunities within their current employment without leaving their current positions.
There is a need to contribute to workforce readiness by creating access to ensure that many more individuals complete a postsecondary degree or credential, they graduate with the skills and abilities to be impactful, and they receive necessary pedagogical training and professional development opportunities to be competitively marketable in their academic and leadership career pursuits.

To determine need, in January 2020 UofL's Delphi Center for Teaching and Learning conducted a market feasibility study which concluded that "the growth in demand for a social work doctorate education is increasing rapidly and more schools are offering or preparing to offer such a degree" and that " based on available industry data, competitor comparison and demand indicators, we [Delphi Center] recommend that UofL's Kent School of Social Work offer an online DSW degree". We also conducted surveys with Kent School of Social Work alumni (graduated in the past 5 years) and our current students in the master's program on their interest in earning the DSW degree. A majority of the respondents indicated that they were considering pursuing the DSW and would enroll/consider enrolling if it was offered at the University of Louisville and it was offered online. A third or more of alumni and current students indicated an interest in the DSW focusing on leadership (i.e., administrative, social service management, social work education, clinical practice) and teaching. Lastly, we examined reports from the Council on Social Work Education (CSWE) on enrollment in DSW programs and employability of DSW graduates. An examination of most recent reports indicated that nearly half of the DSW graduates were employed in academic settings and enrollment in DSW programs has been steadily increasing in the last five years.

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Full Proposal - Quality: Program Quality and Student Success

1. Provide specific programming goals (objectives) and specific learning outcomes for the program.

The purpose of the Doctorate in Social Work (DSW) program within the Kent School of Social Work (Kent School) will be to educate master degreed social workers to become future practitioner scholars in teaching and social service leadership. The DSW program's overall goal is to offer advanced education, training, and mentoring to master degreed social workers who wish to become teaching faculty in departments/schools of social work and/or leaders managing public or private social service organizations. This addresses the needs of the state for competent and well-trained social work professionals in the academic and social service workforce. The DSW program goals are:
• To educate students on models of social service leadership and teaching and learning
• To train students to analyze and improve models of social service leadership and teaching and learning
• To prepare students to implement social service leadership knowledge and skills in practice
• To prepare students to apply teaching skills and learning strategies in instruction
• To educate students to ethically practice in leadership and teaching positions
• To use various modes of scientific inquiry to critically evaluate the practices of social service leadership and teaching and learning.

Graduate of the program should be able to:
• Demonstrate knowledge of models of social service leadership and management
• Demonstrate knowledge of models of teaching and learning
• Critically analyze models of social service leadership and management
• Critically analyze models of teaching and learning
• Apply best practices in social service leadership knowledge and skills in agency settings
• Apply best practices in teaching and learning in the classroom
• Apply research methods to critically evaluate social service leadership and teaching and learning.
• Demonstrate use of social work ethics in leadership actions and in teaching

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2. Describe how the student learning outcomes for the program will be assessed.

Each program-level student learning outcome will be assessed. The point of assessment will be in specific courses in the curriculum with culminating/integrative assignments using direct measures. Rubrics will be used. These assessments will be performed once a year at the end of the course in the semester in which the course is offered. The results will be compared with the benchmarks set for each student learning outcome and presented to the DSW faculty. When benchmark targets are not met, contributing factors for not meeting benchmarks will be identified and a plan will be devised by the DSW faculty to address them. Where benchmarks are met, the benchmarks themselves will be reviewed as to whether to set new benchmarks. The plan may include a number of strategies including instituting changes in curricular content, changes in method of instruction, and providing additional tutorial support and resources to students among others, depending on the contributing factors identified. The implementation of the plan will be monitored and evaluated by the DSW program director so as to ensure that program improvements are being implemented. Findings will be shared at faculty meetings to engage in ongoing continuous quality assessment.

Additionally, student feedback regarding program effectiveness will be sought annually through an online survey at the end of the academic year by asking students to evaluate the DSW program regarding its progress toward meeting the DSW Program Goals, on a 5-point scale, with 1 = “did not meet at all” and 5 “met completely.”

The findings will be distributed to faculty teaching in the DSW program at the last DSW faculty meeting of the year where achievement of benchmark (4 on 5-point scale), and plans for making any needed improvements to the program will be discussed.

Overall program effectiveness will be evaluated by surveying key stakeholders in addition to students (e.g., faculty and staff, school administrators, community partners) each academic year. Findings will be discussed with program faculty as well as the Dean, and improvements in the program will be discussed and a plan for their implementation will be developed and implemented.

3. Highlight any distinctive qualities of this proposed program.

The DSW program is distinctive in its focus on educating and training the working social service professional to advance their career in social service leadership and teaching. As mentioned previously, the program will equip students with both leadership and teaching skills via the proposed integrated curriculum so that graduates will be able to assume either or both social service leadership and teaching faculty positions. The sequential 8-week course offerings provide flexibility and allow the working professional to more deeply concentrate on one course at a time. The teaching and leadership practicums within the applied curriculum provide opportunities for students to integrate and apply course content directly into practice under direct supervision of academic scholars and social service leaders.

The DSW program builds on Kent School of Social Work’s ranking as being in the top 50 schools of social work in the US (US News and Reports Ranking), the #1 ranked social work program in Kentucky, and as a top-ranked online undergraduate (BSW) and graduate (MSSW) program in the nation. The Kent School has 7 faculty who have been recognized by the University of Louisville for teaching excellence and has 5 faculty with research and teaching expertise in social service leadership. On the whole, a real strength of Kent School is the community based and organizational based research and change efforts of all of our faculty, which makes us particularly well suited to offer this program to social workers in Kentucky, the nation, and from around the world.

As can be seen in the faculty roster, a total of nine faculty will initially be part of the program faculty to ensure curriculum and program quality, integrity, and review. As students complete coursework and move into the thesis/capstone project phase, other Kent School faculty and faculty from the broader university with subject matter expertise will be sought out to support students' professional development. Seven of the nine (two full-time term faculty will be hired in the 1st year of the program) are full-time faculty who currently teach at Kent School of Social Work. Of the seven, four are tenured professors, one is a tenured associate professor, one is full-time term faculty, and one is Associate Professor at UofL's School of Medicine and Instructor at Kent School. The full-time faculty have both subject matter expertise and program administration experience at the graduate level. They not only have several decades of collective teaching experience, but also substantive experience in curriculum design, development, and evaluation; identification and assessment of student learning outcomes; as well as student advising.

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4. Describe the admissions and graduation requirements for the program.

Admission requirements for the DSW Degree will include the following:
• Current Resume or Curriculum Vita
• Master's degree in Social Work
• Completed application and application fee
• Three letters of recommendation from individuals familiar with the applicant's work and/or academic ability and performance such as current or former supervisors and instructors
• Official transcripts from all colleges and universities attended
• A writing sample demonstrating the applicant's writing and analytical ability
• Personal Statement of goals for pursuing the DSW degree
• Two years of post-master's degree social work experience
• An interview after review of submitted application materials
• Master's GPA of 3.0. Applicants with a Master's GPA of below 3.0 showing potential for success as demonstrated in their other submitted application materials and/or in the interview for admission into the DSW program will be given consideration for admission.

Graduation requirements are:
• Minimum cumulative GPA of 3.0 at program completion
• Successful completion of all courses in the curriculum plan.
• Proficiency rating of at least 85% on the qualifying assessment
• Successful defense of a thesis or capstone project
• Completion of all school and university requirements for awarding of the degree
• Completion of the program within four years from the time of passing the qualifying assessment

5. Describe the administrative oversight to ensure the quality of the program.

The DSW program will be administered day to day by the DSW program director who is appointed by the Dean of the Kent School and a program coordinator who is hired by the DSW program director. The DSW program director and program coordinator will work with the faculty teaching in the program to achieve the goals and objectives and maintain the quality of the program. The DSW program director reports to the Dean, who has overall administrative oversight of the DSW program.

6. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

As is the case with traditional formats, courses in this program (although offered in a compressed time frame--each course is 8 weeks) will have lectures, readings, assignments, check for understanding tasks, comprehensive/final papers, and other activities to ensure that students are afforded the opportunity to obtain the same depth and breadth of understanding of course content as their peers enrolled in a full-semester course. The curriculum is set so that students take/concentrate on one course at a time (for 8-weeks) before moving on to the next course to ensure a deeper focus into the material. The courses are designed so that students on average would be expected to spend up to twenty hours per week in this compressed approach in comparison to the regular semester format, which is typically expected to be around ten hours a week for a three-credit-hour course. Additionally, as is typically required in doctoral programs, students will need to demonstrate their proficiency by passing a qualifying exam after completing coursework and successfully completing either a culminating project or a thesis to receive the doctoral degree. Faculty teaching in this program are currently receiving consultation on online course development, design, and instruction (particularly as it relates to using compressed format) with UofL's Delphi Center for Learning and Teaching staff to adequately use the best online teaching methods to engage and support the online learner in critical thinking, analysis, and synthesis of course materials. Tracking of student learning outcomes will be utilized to assess student knowledge and competencies, as well as direct feedback from students as is routine in traditional format courses.

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7. Required Credit Hours for Program

Name	Total number of hours required for degree	Number of hours in degree program core	Number of hours in guided electives	Number of hours in free electives
Program	44	44	0	0

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Full Proposal - Demand: Program Demand/Unnecessary Duplication

1. Student Demand:

a. Provide evidence of student demand. Evidence of student demand is typically in the form of surveys of potential students or enrollments in related programs at the institution, but other methods of gauging student demand are acceptable.

We conducted surveys with Kent School of Social Work alumni who graduated in the past 5 years and our current students in the master's program on their interest in earning the DSW degree. The top future goals selected from a list provided by both alumni and current students were the following: advancing within their current organization, enhancing their knowledge and expertise, increasing their earnings, taking on a leadership role in their field, and teaching and providing education services. A majority of the respondents indicated that they are considering pursuing the DSW and would enroll/consider enrolling if it was offered at the University of Louisville. A third or more of alumni and current students indicated an interest in the DSW focusing on leadership (i.e., administrative, social service management, social work education, clinical practice) and teaching (see results below).

Alumni and Current Student Interest in the DSW
Considering DSW 74% of Alumni
Considering DSW 80.6% of Current Students
Would Consider Enrolling in DSW at UofL 77% of Alumni
Would Consider Enrolling in DSW at UofL 90% of Current Students
Would prefer DSW program be 100% online 54% of Alumni
Would prefer DSW program be 100% online 56% of Current Students
Interest in Administrative leadership 48% of Alumni
Interest in Administrative leadership 33% of Current Students
Interest in Leadership in social work education 40% of Alumni
Interest in Leadership in social work education 38% of Current Students
Interest in Leadership in social service management 40% of Alumni
Interest in Leadership in social service management 40% of Current Students
Interest in Leadership in clinical practice 45% of Alumni
Interest in Leadership in clinical practice 48% of Current Students
Interest in University teaching 54% of Alumni
Interest in University teaching 53% of Current Students
Prefer 8 week Term/sessions 57% of Alumni
Prefer 8 week Term/sessions 53% of Current Students

1. Student Demand:

b. Project estimated student enrollment and degrees conferred for the first five years of the program.

Academic Year	Degrees Conferred	Majors (Headcount) - Fall Semester
2021-22	0	16
2022-23	0	29
2023-24	11	40
2024-25	11	40
2025-26	11	40

2. Employer Demand

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Job	Reg Wage	Reg Open	Growth %	St Wage	St Open	Growth %	Nat Wage	Nat Open	Growth %
Head of Social Service Agency/ Social & Community Service Managers	64698	1460	13.4	61810	260	14.4	72900	17800	13.0
Social Work Faculty	67794	100	4.5	64450	10	6.7	78320	1500	7.5

2b. Clearly describe evidence of employer demand.

According to the Bureau of Labor Statistics, there are 682,100 Social Worker jobs in the US. Social worker employment is expected to grow 16% between 2016 and 2026 - much faster than the average growth rate (8%) across all careers in the US. PhD and DSW professionals earn $20-$25,000 more than MSWs and $38,000+ more than BSW professionals (National Social Work Workforce Study, 2017). Labor Insight (2019) ranked jobs and positions seeking a DSW as the 9th most sought after in the Commonwealth and 16th in the nation.

Entities hiring DSW graduates include universities, government agencies, non-profit agencies, and consulting firms. Jobs requiring or encouraging a doctorate degree include private clinical practice, faculty, academic administration, consulting, non-academic administration, and high-level program or systems management. Skills in demand (aligned with a doctorate degree) include academic instruction, supervision, policy analysis, curriculum development, and community programs development. Specifically, practice doctorate graduates are primarily going into non-academic administrative positions (22.9% of graduates) and private clinical practice (17.7%); however, tenure-track faculty positions at CSWE-accredited programs (15.6%) and non-tenure-track faculty positions at CSWE-accredited programs (12.5%) are also first destinations.

3. Academic Disciplinary Needs:

If the program proposal is in response to changes in academic disciplinary need, as opposed to employer demand, please outline those changes. Explain why these changes to the disciple necessitate development of a new program.

This program is designed for students to enter the workforce immediately after graduation.

4. A new program may serve the same potential student population. The proposed program must be sufficiently different from existing programs in the state or access to existing programs must be sufficiently limited to warrant initiation of a new program.

4a - Provide the following information: a comparison of objectives/focus/curriculum to similar programs, student populations, access to existing programs, and feedback from other institutions.

The main difference is that our program focuses on teaching in addition to social service organizational leadership. Our method of delivery is accelerated, and sequential offering of courses allows for greater flexibility for the working professional to advance their career goals.

There will be some overlap in both programs in target student population, as both programs will be targeting students interested in leadership. However, because our program is part-time and UK's program is full-time, our target student population will be different.

Our program is focused on reaching the professionals working in agencies/organizations as well teaching in social work programs. UK's program does not focus in these areas and thus would not be responsive to this student population.

The Dean of Social Work at UK, Jay Miller, said "we are in full support of the DSW program at UofL. The market segment is large enough for multiple programs. AND, the online nature of both programs greatly expand the market."

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4b - How will the program support or be supported by other programs within the institution?

The DSW degree program will be a stand-alone program. However, students will have opportunities to work with faculty at Kent School not teaching in the DSW program and faculty outside of Kent School as they work on their capstone project/thesis specific to their substantive area of interest.

4c. Our records indicate the following similar programs exist at public institutions in Kentucky.

#Enr = Fall Enrollments , #Grd = Academic Year Graduates

		2020 - 21		2019 - 20		2018 - 19		2017 - 18		2016 - 17		2015 - 16	
Institution	Program	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd	#Enr	#Grd
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Full Proposal - Cost: Cost and Funding of the Proposed Program

A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
	0	0	0	0	0
Total Resources Available from Federal Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Total Resources Available from Other Non-State Sources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
State Resources					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Internal					
Allocation :	0	0	0	0	0
Reallocation :	296240	304227	312454	328928	329656
Narrative Explanation/Justification :	For the start-up of the program, $296,240 will be allocated to the funding from existing funds which reside in the Dean's Office for new program initiatives and needs of the school. These funds are tuition generated from all programs at Kent School, which are pooled and reside in one account that the school uses to settle its expenses as well as fund new initiatives.				
Student Tuition					
New :	159192	302907	339389	339389	339389
Existing :	0	0	0	0	0

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A. Funding Sources, by year of program	1st year	2nd year	3rd year	4th year	5th year
Narrative Explanation/Justification :	The student tuition generated is based on Cost per credit hour X number of credit hours X number of students. The figures reported here are based on 75% (net of mandatory student fees) of tuition review revenue allocated according to a student's home academic program as is required and is in alignment with the latest budget assumptions (provided below as of 10/7/19) from the Budget Model Workgroup. Our plan is to admit 20 students each year with the expectation that 16 will enroll in the program (20% attrition). The tuition calculation is thus based on 16 students enrolling in the program the 1st year. Thus, the tuition generated in the 1st year (net of mandatory fees) is the credit hour cost for online course $737(.75) X 18 credit hours X 16 students. The tuition generated in the 2nd year is for 29 students enrolled in the program, a result of 16 being in the 1st year class cohort for 18 credit hours and the other 13 being in the 2nd year class cohort of the program enrolled for 20 credit hours, taking into account an estimated retention rate of 80% from year 1 to year 2. As 3rd year class cohort is working on their thesis/capstone project, they will be enrolled for a total of 6 credit hours. In sum, in the 3rd year of the program we expect to have 16 students enrolled in the 1st year class cohort, 13 in the 2nd year class cohort (80% retention rate), and 11 in the 3rd year class cohort (70% retention rate from year 1 to year 3) for a total of 40 students in the program by the third year. These figures are anticipated to same for the 4th and the 5th year of the program.				
Total					
New :	$159,192	$302,907	$339,389	$339,389	$339,389
Existing :	$296,240	$304,227	$312,454	$328,928	$329,656
Total Funding Sources :	$455,432	$607,134	$651,843	$668,317	$669,045

B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Staff: Executive, administrative, and managerial					
New :	64000	65920	67898	69935	72033
Existing :	10000	10000	10000	10000	10000
Other Professional					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Faculty					
New :	179200	184576	190113	195817	201691
Existing :	23040	23731	24443	25176	25932
Graduate Assistants (if master's or doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Student Employees					
New :	0	0	0	0	0

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Equipment and Instructional Materials					
New :	10000	10000	10000	10000	10000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	Since this progam will be 100% online, $ 10,000 is alloted for the progam to use for developing and/or purchasing instructional materials to support online instruction.				
Library					
New :	10000	10000	10000	10000	10000
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	In the Library's analysis of resource materials needed to support the DSW program, the library requests that If faculty will be requesting electronic resources to support the program and/or meet accreditation needs, the library would require financial support from the program to do so. Therefore, a sum of $ 10,000 is allotted to support the library for resource materials.				
Contractual Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Academic and/or Student Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other Support Services					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Development					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Assessment					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					

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B. Breakdown of Budget Expenses/Requirements	1st year	2nd year	3rd year	4th year	5th year
Student Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Faculty Space and Equipment (if doctorate)					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :					
Other					
New :	0	0	0	0	0
Existing :	0	0	0	0	0
Narrative Explanation/Justification :	A fulltime program coordinator for the program at an intial salary and fringe (28%) of $64,000 with 3% increase in cost of living expenses in subsequent years. The salary was determined by examining current salary ranges at UofL for a administrative/professional positions which range from $47,476 to $61,834. Two fulltime faculty will be hired in the 1st year of the program ($70,000 salary @28% fringe for each faculty member) for $179,200. Fulltime social work faculty starting salary is around $70,000 according to recent starting salalries of recently hired faculty at Kent School and at regional schools. A 3% cost of living is included in subsequent years. It is expected that on average 3 courses each year would be taught by existing faculty. Teaching one course is 10.5FTE or equivalent to $6,000 (the current cost of buying out of a course at Kent School), so $23,040 (cost plus 28% fringe) is allocated for existing fulltime faculty teaching in the DSW program starting in the first year, and a 3% cost of living increase is added on for subsequent years. $10,000 is allotted each year for faculty responsible for administering the program during the summer months.				
Total					
New :	$263,200	$270,496	$278,011	$285,752	$293,724
Existing :	$33,040	$33,731	$34,443	$35,176	$35,932
Total Budget Expenses/Requirements :	$296,240	$304,227	$312,454	$320,928	$329,656
Grand Total					
Total Net Cost :	$159,192	$302,907	$339,389	$347,389	$339,389

University of Louisville
DSW - Doctor of Social Work
44.0701-Social Work.
Submission Date: 04/20/2021 10:38

Full-Proposal - Assess: Program Review and Assessment

1. What are the plans to evaluate students' post-graduate success?

The DSW program will abide by and follow all university/CPE/SACSCOC requirements for program review. Using the resources available through University of Louisville's Institutional Research and Planning Office, the DSW program will conduct an annual online survey of graduates, alumni, and employers. The program will collect information about preparedness of graduates for the workforce, and curricular elements that have been most impactful should be emphasized or emphasized more to better prepare graduates for the workforce. In addition, data will be gathered on type of employment and opportunities/promotions/salaries afforded since earning the degree. Examples of questions include:
• What aspects of the curriculum best prepared you for your present position/ employment?
• What aspects of the curriculum were most impactful for your present position/employment?
• What course content was missing and should be added to the curriculum?
• What course content should be emphasized more in the curriculum?
• What course content should be dropped/eliminated from the curriculum?
• How well did the mentoring and advising you received in the program prepare you to be successful in the program? Successful in the workforce?
• What should be added to the mentoring/advising component of the program? What should be eliminated?

These questions will also be directed at employers of graduates to get their perspectives and recommendations for program improvements to better prepare graduates for the workforce.

TITLE: Data, Research and Advanced Analytics Unit Update

DESCRIPTION: CPE staff will present an update from the CPE's Data, Research and Advanced Analytics team, discuss the newest research brief on income disparities along racial and ethnic lines, and review upcoming research.

PRESENTERS: David Mahan, Ph.D., Associate Vice President, Data, Research and Advanced Analytics

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RESEARCH BRIEF

CPE report shows large income gaps along racial and ethnic lines. Despite growing diversity in Kentucky's workforce, Black and Asian employees still face massive income disparities when compared to white peers, even after earning a superior college degree. The analysis shows that, on a median basis, Black, Asian and Hispanic workers in Kentucky continue to earn less than white counterparts do over a lifetime. In many cases, the gaps are severe. Overall, the report found that college degrees provide financial benefits for all racial and ethnic groups and often help narrow the income disparities with white workers. CPE staff will review the data behind the brief, which has been included as an attachment.

UPCOMING RESEARCH

- HB419 Kentucky Student Right to Know Act (interactive report from CPE/ KYSTATS)
- Economic impact of Kentucky certificate completers (CPE/UK Martin School)
- KCTCS dual credit student outcomes
- The impact of COVID19 on Kentucky college going rate (CPE/KCTCS)
- The 2nd edition of the 'ROI' (return on investment report from CPE/KCTCS)
- Early career workforce outcomes: Which academic programs have no earning gaps for their under-represented minority and low-income graduates (CPE, EMSI/CAEL)

Research Brief

Earnings Gaps Based on Race/Ethnicity and Education Level

The last of three research briefs on lifetime earnings in Kentucky

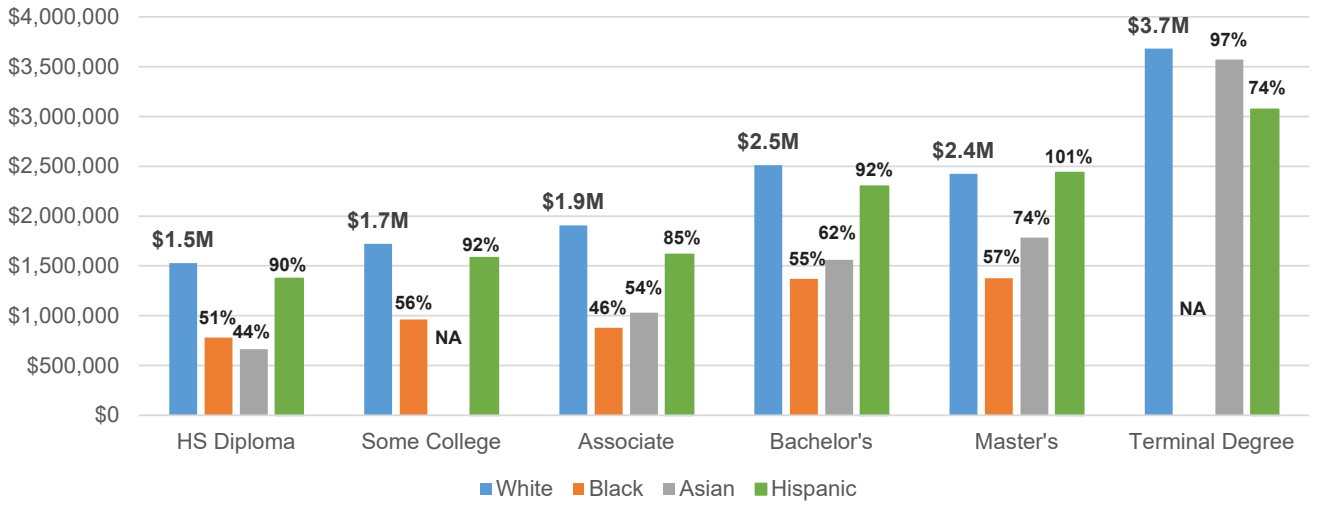
Differences in lifetime earnings between racial and ethnic groups

The last in a three-part series, this research brief examines race-based disparities in the lifetime earnings of Kentuckians at the same educational attainment level. It relies on data from the 2016-18 American Community Survey to approximate lifetime earnings for full-time workers with at least a high school diploma.[1] Note that these comparisons are statistically uncontrolled; they measure race-based disparities in median lifetime earnings regardless of job type, seniority, location, and years of experience. These data include only respondents who identified as a single race with no Hispanic ethnicity/nationality (i.e., white, Non-Hispanic; Black, Non-Hispanic; and Asian, Non-Hispanic). There were not enough respondents in the sample to estimate earnings for Asian, Non-Hispanic Kentuckians with some college, or Black, Non-Hispanic Kentuckians with a terminal degree. For purposes of this brief, Hispanic includes respondents of any Spanish race or nationality (e.g., Cuban, Mexican, Puerto Rican).

Lifetime earnings of white Kentuckians exceed nearly all others

Although the data demonstrate a positive relationship between postsecondary education and lifetime earnings across racial and ethnic groups, white Kentuckians had the greatest lifetime earnings at all educational levels. Figure 1 expresses the median lifetime earnings of Black, Asian and Hispanic Kentuckians as a percent of the lifetime earnings of white Kentuckians. For instance, Black bachelor's degree holders earned only 55% of what white bachelor's degree holders earned over a lifetime ($2.5 million, which means Black bachelor's degree holders earned approximately $1.4 million). Since these comparisons are uncontrolled, "occupational segregation" is a larger factor in earnings differences between Kentucky residents of color and white

Figure 1. Lifetime Earnings of Kentuckians by Educational Attainment and Race/Ethnicity[2]



1. U.S. Census Bureau. Oct. 2012. Creation of the Synthetic Work-Life Earnings Estimates for Field of Degree Brief and Infographics. https://www.census.gov/library/visualizations/2012/comm/pathways-series/synthetic-work-life-earnings-estimates.html

2. Lifetime earnings of Black, Asian, and Hispanic Kentuckians are expressed as a percentage of White, Non-Hispanic amounts at each educatio

Kentuckians. This is widely considered an opportunity gap for entry into higher paying professions, even at the same educational attainment level.[3]

Asian Kentuckians earn far less than similarly educated white peers

Nationally, Asian students comprise a larger proportion of admissions to selective institutions and have a greater likelihood of completing a bachelor's degree than white students.[4] Still, the median lifetime earnings of Kentucky Asian graduates across all education levels are far less than their similarly educated white peers. Among all racial/ethnic groups, Asian high school graduates reported the lowest median lifetime earnings relative to white high school graduates (44% of white earnings). The disparities in median lifetime earnings of Asian graduates were least pronounced at the terminal degree level (97% of white earnings) and most pronounced at the associate degree level (54% of white earnings).

For Black and Hispanic Kentuckians, terminal degrees are few and often delayed

Black and Hispanic Kentuckians remain underrepresented among workers with terminal (advanced or professional) degrees. The data sample redacted Black Kentuckians under age 30 with either a doctoral or professional degree due to small sample size. Although the dataset does not enable a more thorough examination of these cases, the most probable cause is an extended timeframe to a bachelor's degree. Some Black students enter into a master's program rather than immediately matriculating into a terminal degree program. Black and Hispanic Americans also are significantly underrepresented in professions requiring a terminal degree, such as physicians and dentists.[5] Such inequities for underrepresented minority students can delay their entry into the workforce, which ultimately decreases lifetime earnings.

Summary

Black, Asian, and Hispanic graduates in Kentucky face concerning disparities in lifetime earnings. These wage gaps weaken the value of higher education among prospective minority students. Kentucky postsecondary institutions should continue to prioritize increases in enrollment, retention and graduation for minority students, and work with employers to raise awareness of wage gaps among similarly educated minority employees. Providing early college experiences to racial/ethnic minority students, as well as leadership training and exposure to professional career paths, may also lessen wage and income disparities over time.

3. https://www.payscale.com/data/gender-pay-gap#section14

4. Espinosa, Lorelle L., Jonathan M. Turk, Morgan Taylor, and Hollie M. Chessman. 2019. Race and Ethnicity in Higher Education: A Status Report. Washington, DC: American Council on Education.

5. U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. 2017. Sex, Race, and Ethnic Diversity of U.S, Health Occupations (2011-2015), Rockville, Maryland.

TITLE: Summer Bridge Program Grants

DESCRIPTION: Staff will provide an overview of the CPE's summer bridge program grants, which was awarded to support the preparation of students for early college success.

PRESENTERS: Amanda Ellis, Associate Vice President of K-12 Policies and Programs, CPE

SUPPORTING INFORMATION

The Governor's Emergency Education Relief Fund, known as GEER II, provided the ability for CPE to provide grants of up to $100,000 for summer "bridge" programs designed to prepare students for college and help them return for a second year. Earlier this spring, all of Kentucky's public colleges and universities, along with institutions in the Association of Independent Kentucky Colleges and Universities, were eligible to apply for the grants through the RFP process. Campuses were asked to describe their proposed program and how the funds would be used.

In early May, CPE announced the 21 institutions whose proposals were accepted, and as a result $1.5 million in grant money will be distributed to provide support summer opportunities for more than 1,800 high school and first-year college students across the state.

The summer bridge programs being conducted typically last from one to six weeks and use a range of strategies to promote early college success. Examples include orientation to college life, social and emotional resources, academic or financial advising, training in time management or study skills, accelerated coursework or similar supports. The following institutions were approved for the grants:

- Eastern Kentucky University
- Kentucky State University
- Morehead State University
- Murray State University
- Northern Kentucky University
- Western Kentucky University
- Big Sandy CTC
- Bluegrass CTC
- Elizabethtown CTC
- Henderson CTC
- Hopkinsville CC
- Bellarmine University
- Centre College
- Kentucky Wesleyan College
- Lindsey Wilson College
- Union College
- University of Pikeville
- Jefferson CTC
- Maysville CTC
- Owensboro CTC
- West Kentucky CTC

TITLE: Statewide Strategic Agenda Development – Update June 2021

DESCRIPTION: Committee members will engage in a discussion of the qualitative data analysis conducted between March and May 2021, and review drafted mission, vision, and value statements that will drive the overall agenda.

PRESENTERS: Stefanie Ashley, EKU Facilitation Center
Lee Nimocks and Melissa Young, CPE staff

BACKGROUND INFORMATION

The CPE is directed by KRS 164.020 to develop a statewide strategic agenda for the public postsecondary education system and revise it on a regular cycle. The agenda identifies statewide priorities and a vision for long-term economic growth by improving the education and skill levels of Kentucky's workforce. The agenda sets performance goals for students and institutions that reflect high expectations and standards, emphasizes continuous improvement, and supports technology-based solutions and innovative practices.

Qualitative Data Dive

CPE consulted with the EKU Facilitation Center to conduct an intensive qualitative study as part of the overall environmental scan. This included executive interviews with:

- Five (5) of Kentucky's elected and state officials
- Ten (10) of Kentucky's university and college presidents
- Fourteen (14) representatives of national organizations

The interviews were conducted via telephone and online between March 31 and May 17, 2021. The interviews ranged from 20 to 40 minutes and culminated into approximately 12 hours of interviews. Each interviewee was asked a standardized set of questions that were sent in advance of the interview.

In addition, 11 focus groups were conducted virtually between April and May 2021. Nearly 150 people participated in these focus groups, ranging from university faculty, staff, administrators and students to workforce representatives. For some of the focus groups, specific topics were discussed by diverse groups. These topics included:

- College Affordability
- Diversity, Equity, and Inclusion
- Education to Work
- Engaging the Adult Learner
- P-12 Partnerships

In addition, specific groups were convened to reflect on the last strategic agenda and identify focus areas for the 2021-2030 Strategic Agenda. Specific groups included:

- Campus Advisory Committee (Institutional research and strategic planners)
- Chief Academic Officers
- Chief Business Officers (Budget and Financial officers)
- CPE Senior Leadership Team (Director-level and above)
- Faculty Advisory Group
- Student Advisory Group

The Executive Summary of the Environmental Scan has been included in your materials. Stefanie Ashley of the EKU Facilitation Center and Lee Nimocks will engage the Committee on a discussion of the major findings that came from the scan.

Vision, Mission and Value Statements

At its April 15 work session, Council members engaged in a discussion about the Mission, Vision and Values of the new strategic agenda. The board responded to a number questions including:

- What are Kentucky's greatest strengths, and where are we leading the way?
- What are you proud of?
- What will be different for Kentucky and/or its residents in 2030 when 60% of Kentuckians have achieved a high-quality postsecondary degree or certificate?
- Thinking beyond 2030, what is the ultimate outcome or aspiration of a strong, vibrant postsecondary education system in Kentucky?
- What is your biggest, boldest dream for what postsecondary education can achieve?
- What principles or beliefs must guide decisions and behaviors for the strategic agenda to be successful?

- What role does CPE play in helping higher education achieve this lofty vision and strong purpose?

Based on responses from the board, as well as input through the interviews and focus groups, staff has drafted preliminary vision, mission and values statements for review by the ASI Committee. Staff will review these drafted statements with the Committee, gather feedback, and prepare final statements for approval at the July 13 meeting. Drafted statements have been provided in OnBoard.

Kentucky Council on Postsecondary Education

2021-2030 Strategic Agenda | Environmental Scan

Qualitative Study | Executive Summary

March – May 2021

Research and reporting conducted by the Facilitation Center at EKU

Background

In preparation for developing the 2021-2030 Strategic Agenda for higher education in Kentucky, the Council on Postsecondary Education conducted an intensive qualitative study as part of their environmental scan. This included executive interviews with:

- Five (5) of Kentucky's elected and state officials
- Ten (10) of Kentucky's university and college presidents
- Fourteen (14) representatives of national organizations

These interviews were conducted via telephone and online between March 31 and May 17, 2021. The interviews ranged from 20 to 40 minutes and culminated into approximately 12 hours of interviews. Each interviewee was asked a standardized set of questions that were sent in advance of the interview.

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- P-12 Partnerships

In addition, specific groups were convened to reflect on the last strategic agenda and identify focus areas for the 2021-2030 Strategic Agenda. Specific groups included:

- Campus Advisory Committee
- Chief Academic Officers
- Chief Business Officers
- CPE Senior Leadership Team
- Faculty
- Students

A complete list of participants and the executive summaries from the executive interviews can be found in the Appendix. More detailed reports for the executive interviews and focus groups are also available.

Executive Summary

Overarching Themes

While the questions varied between the groups, there were four overarching themes that emerged from every group.

1. It came out in many forms (i.e., affordability, perceived affordability, access, cost, tuition, ancillary costs), but the affordability of higher education was identified as a primary concern from the focus groups and almost every individual interview.
2. Kentucky is focused on the right areas for success and those areas are not likely to change between now and 2030. However, Kentucky needs to be more aggressive in targeted areas, especially those areas where evidence-based practices have proven successful (e.g., early enrollment programs).
3. Recruitment clearly needs to be a state focus to achieve its goal of 60 percent of Kentuckians with a high-quality degree or credential by 2030. There were three distinctions that emerged from that sentiment that were threaded throughout the focus groups and interviews:
    i. The importance of reaching students at an earlier age (i.e., before their senior year) to identify postsecondary and financing options.
    ii. Tied to reaching students earlier, is the point made numerous times that higher education cannot achieve the 60 x 30 goal alone and must strengthen partnerships with P-12.
    iii. Kentucky will not reach the 60x30 goal without greater recruitment and retention of adult, low-income, and minority students, and the state has not had a lot of success in recruitment of these populations.
4. The recent pandemic and social justice movements have shed a bright light on existing inequities within the state and higher education is taking notice. The theme of equity was prevalent throughout many topics of discussions. The inequities identified varied (e.g., racial, income, digital divide), but it is clear there are opportunity inequities both impacting higher education and within higher education that are top of mind for many who were part of these discussions.

Kentucky's 60 x 30 Goal

There was general agreement the quantifiable goal of 60 percent of Kentuckians with a high-quality degree or credential by 2030 is good for Kentucky and its residents. Some of the national organizations interviewed believed it may be too low or slow (i.e., 80% x 2030 or 60% x 2025), while university and college presidents raised concerns regarding the state's ability to hit the goal, especially given recent enrollment declines, impacts of the pandemic, and decreasing FAFSA completion rates.

One participant articulated what several alluded to regarding the importance of communication and messaging in higher education:

Attainment is not always the answer to a lot of the problems we are trying to solve. Attainment in what and for what? What does the attainment goal mean? Who are the faces behind attainment? It is not just numbers, but how many lives changed and how? How many opportunities were given, and what were the results of those opportunities (e.g., intergenerational wealth or regions changed)?

Barriers

The top five barriers to postsecondary education are listed below. Affordability clearly emerged as the greatest barrier to postsecondary education. The additional barriers stood out as the most concerning barriers by the vast majority of participants but are not prioritized. Based on the interviews with the national organizations, these barriers are not unique to Kentucky and are nationwide concerns.

1. Affordability

- College Readiness
    - Academic readiness
    - Lack of belief and encouragement
- Complexities for Adult Learners
- Opportunity Inequities
    - Digital divide
    - Diversity, equity, and inclusion
    - Income inequities
- Persistent questions about the value of higher education

2021 – 2030 Areas of Focus

Many participants were asked to reflect on the 2016-2020 strategic agenda for postsecondary education. Based on the responses, Kentucky was focused on the right issues for their 2016-2021 agenda and the focus areas have not changed thinking forward to 2030, even with the impact of the COVID-10 pandemic. What has changed is the need to be more aggressive and innovative in how those goals are met.

Many of those interviewed from national organizations also mentioned their concern that with the recent influx of one-time, federal relief money, institutions will be tempted to back fill and go back to pre-pandemic practices and policies. However, several believe the most successful institutions will be those that use those funds for new, innovative approaches.

Six broad areas emerged from the discussions as key focus areas through 2030, each with several sub-topics that were highlighted by numerous groups. The topic of diversity, equity, and inclusion could have been a separate focus area however, it was truly interwoven throughout each of the six focus areas and therefore has been presented in that integrated manner.

- Affordability
    - Broader and deeper awareness of financial aid options
    - Financial support for ancillary costs (e.g., books, food, housing)
    - Guidance/Support on completing financial aid forms and financial/debt management
    - Institutional balancing act of keeping tuition affordable, while state support declines
    - Preparation for free two-year college

- Industry and Workforce Partnerships
    - Aligning workforce needs and higher education offerings to be prepared for current and future careers
    - Addressing significant workplace trends, especially around technology (e.g., automation artificial intelligence, working remotely)
    - Balancing the pendulum between technical certificates and four-year degrees
    - Growing interest and need for on-the-job learning and experience (e.g., internships, apprenticeships) and embedded credentials
- P-12 Partnerships
    - Academic readiness
    - Financial access/information
    - Opportunity inequities
    - Recruitment
- Recruitment
    - Adult learners
        - Innovative policies and practices that meet their complex needs
    - Encouraging potential students, when they may not be getting encouragement at home or school
    - Out-of-state students
    - Underrepresented, minority students
- Success
    - A student's return on investment should not be a gamble
    - Fast funding options
    - Leveraging technology benefits
    - Student-centered experiences that support the students being admitted
        - Appreciation and understanding of "working learners" and inequities (i.e., dispelling the belief that if they worked harder, they would achieve)
    - Wrap-around support services (e.g., mental health, food banks)
- Value of Higher Education
    - The value of higher education continues to rise
    - The perceived value of higher education continues to be questioned
        - For low-income and minority students, the question of value has never been in question
    - The value varies depending on the credential, industry and successful completion

Potential Strategies

After identifying focus areas, participants were asked about successful strategies to address the concerns. A variety of ideas were shared and below is a selection related to the key themes.

Affordability

- A New York college system has the Accelerated Study in Associate Programs (ASAP), which has been highly effective in getting community college students through to completion more quickly

- A multi-faceted approach is needed, including policies, CPE and at the institutions
- Assist with connecting students to state benefits (e.g., SNAP)
- Continued encouragement of FAFSA completion and explore ways it can be required
- Greater focus on need-based aid
- Increase fast funding options
- Workforce partnerships (e.g., tuition-match, take class at work)

Diversity, Equity, and Inclusion

- Diversity, equity and inclusion must be fully integrated into the campuses and not just a checklist. It also has to go beyond that:
    - Issues are larger than cultural competence and courageous conversations need to happen around anti-racism.
    - Transitioning from a culturally competent higher education environment doesn't always match the business or community culture graduates go into.
- Policies and data must be reviewed to ensure practices aren't exacerbating inequity issues (and they should be reviewed by a diverse group). Who is taking advantage of dual credit? Once students of color get to college, do they have the support they need? Do all students of color feel included? Who is using the wrap around services? Curriculum reviews?
- The belief gap is real, in both students and those advising them. Diverse advisers are needed in the high schools and diverse faculty and other supporters are needed at the college level.

Industry and Workforce Partnerships

- A state position dedicated to aligning opportunities and making workforce connections. Louisiana is an example.
- Adults who choose higher growth/wage industries can get their education paid for in Indiana.
- Align state regions based on economic, workforce and higher education variables (e.g., Region 1 includes x counties and is the same in terms of economic development, workforce development and higher education). Tennessee is an example of this.
- Arizona's strategy around reskilling and recovery, which strategically connects workforce and the community college system
- Embedded certificates, such as Wisconsin's Community and Technical College System
- Identify the right balance of technical certificates and four-year degrees for Kentucky?
- Increase practical, hands-on experiences for students, along with faculty/industry collaboration
- Leverage research capabilities at the university level to support local industries (e.g., technology and automobile manufacturing)

- Oklahoma's Promise Scholarship is a good example of an initiative that has kept students employed in their state and is similar to Kentucky's Gear Up, but has financing attached to it.
- Strike a balance between high standards and expectations and increasing accessibility
- Using direct research, Indiana makes the connection between majors and workforce outcomes in their states. They develop a report showing the students who come out of a program, what they do in the job market in their state, and what they make.

P-12 Partnerships

- Expanded, equitable, early college enrollment programs
- Friction free career pathways
- Leverage the Every Student Succeeds Act that includes report cards for high schools and opt in for college-going and completion rates.

Recruitment

- Holistic changes to be more amenable to adult learners
- Increase focus on recruiting low income and minority students.
- Indiana's You Can Go Back initiative, which is one portal aligned across institutions to let adult learners know what is available to them
- Statewide recruitment efforts, especially for adult learners and out-of-state students
- Streamline credit for prior learning for adults, including workplace and military experience
- The messenger matters (e.g., messages are more powerful coming from people the potential students know and respect, or people that look like them or had similar experiences)
- Try it before you buy it options for adult learners (i.e., they don't have a Dual Credit option)

Success

- Audit policies to find those not designed for today and are inadvertently making racial inequities worse
    - Explore policies and practices to ensure students of color get into pathways that lead to high-wage work
- Explore co-requisite models of developmental education, so students can go directly into credit bearing courses and more quickly begin courses of interest to them
- Streamline the processes and acceptance for transfer credits; Articulation agreements that are robust in practice, not just theory
- Tennessee's High Impact Practices Taxonomy Project, which codes experiences with evidence-based practices across the state
- The advising and mentoring strategies incorporated with the Tennessee Promise program

Value of Higher Education

- Consumers most value programs of student connected directly to a career.
- Highlight what the pandemic exposed regarding value, which was those with a bachelor's degree had more resiliency through the pandemic and those with even some postsecondary education were better off than those without.
- North Carolina has done a good job of getting everyone to coalesce around the value and importance of higher education. It's not just one sector carrying the baton, but a state initiative with involvement from the legislature, government and private/public institutions.
- Stackable credentials
- Work towards depoliticizing higher education

Metrics

Some interviewees and focus groups were asked about metrics the state uses for success. There were four potential metrics identified as missing.

- Adult learners
- Clear, defined metric around affordability (e.g., top line tuition in relation to regional per capita income)
- Innovation
- Under-prepared students

The Role of a Coordinating Body

Some interviewees were asked about strategies of other coordinating bodies and the topic organically emerged in other interviews. It was clear that Kentucky is a national leader, especially as it relates to data and data infrastructure, as well as, the leadership of Dr. Aaron Thompson and the CPE team. Common themes identified for the role of a coordinating body included:

- Celebrate and promote innovation, including hosting Think Tanks for relevant and challenging topics (e.g., If higher education is facing an enrollment cliff, what does that look like when it's played out to the workforce? How can higher education diversify funding? How can we reliably ensure students have no/limited interruption of learning in the future?)
- Convener: Pulling together the state to sing from the same song book (e.g., higher education, chambers of commerce, employers, pastors)
- Coordinated messaging that college is affordable and how you do it
- Develop collaborative, streamlined approaches, so the universities can be more nimble (e.g., reporting)
    - Centralized place for adult/out-of-state students to explore their options, programs and how to pay

Appendix: Executive Interview Summaries

Elected Officials

The Value of Higher Education

There was unanimous agreement by those interviewed that higher education is valuable to Kentucky and its residents. For residents, the specific values mentioned were increased wages and improved quality of life. The value to the state is as a workforce development tool, by providing a better workforce for business and industry.

The value of higher education is shifting. One change identified is the value shifting away from four-year degrees to technical training and certificates. Within four-year colleges and universities, two distinct value shifts also emerged. The first is greater value in the STEM fields and the second is about employability of the current workforce. Employability includes positioning the workforce so technological advances won't replace them and retraining for second careers.

Ways to enhance the actual or perceived value of higher education centered around reaching the audiences earlier, from students to legislators. For students, it was reaching out to them early in high school (i.e., freshman, sophomore) with better career education and continually reinforcing their opportunities through encouragement (that they may not be getting at home) and from local leaders with lived experiences of how higher education improved their lives. For legislators, it was reaching out to new members with demonstrated returns and benefits of higher education.

Barriers

Participants identified two barriers: 1) cost and 2) lack of preparation. Cost includes tuition, lack of understanding the financial options and navigating the financial aid systems, and ancillary costs (e.g., childcare). The lack of preparation diverged into several points, including literacy rates and lack of encouragement from schools and families.

Supporting Kentucky's Goals

Better alignment is needed between higher education and industry for Kentucky to have a properly trained, healthy workforce for the jobs of today and in the future. It was mentioned that for future jobs, particularly related to technology, a greater focus was needed on university research. One participant also noted striking a balance between high standards and expectations and increasing equitable accessibility (e.g., affordability).

Pandemic

A positive impact of the pandemic was learning how to deliver educational services remotely and asynchronously. This leveraging of technology was not just in higher education, but in every industry, which fast-tracked automation. One area where Kentucky will see this impact is in auto manufacturing and it will be critical for the workforce, and those educating the workforce, to keep pace.

National Organizations

More than half of the respondents identified trends in the following four areas.

Affordability: The growing cost of higher education was identified as concerning, but respondents also included potential solutions, such as alternative financing mechanisms, potential comprehensive financial aid reform and free tuition at two-year institutions.

Aligning Workforce Needs and Higher Education Offerings: Defining and aligning the current and future workforce needs with what is offered from postsecondary institutions, including credentials. This includes stackable and short-term credentials once thought of as only offered by technical colleges or the workforce development arms of four-year institutions. Balancing the pendulum between technical certificates and four-year degrees is also going to be critical.

Alternative Providers and External Involvement: Shift the focus of online platforms and industry giants (e.g., Amazon) as competitors to potential partners. Identify those that are providing quality education and explore potential partnerships, hybrids, or how those credentials can be counted towards a degree.

Diversity, Equity and Inclusion: Important conversations have been occurring around diversity and equity, which has brought racial inequities in higher education to the forefront. Some gains were made with students of color, but the pandemic was a big setback for this population; their decrease in enrollment was greater than other students. Equity concerns also exist with the focus on skill-based certificates and two-year degrees as people of color are encouraged in that direction.

The majority of respondents believe the value of higher education continues to increase, but conversely, public erosion of confidence also continues to increase, leading to a decrease in perceived value. Additionally, the value varies, based on the credential, the industry, and successful completion, as well as, your race and income levels.

Almost every person interviewed mentioned affordability or the perceived affordability as one of the greatest barriers. Complexities for adult learners was the second most highly mentioned barrier.

A wide variety of successful initiatives were identified, with the most centering around alignment with the workforce, equity, leveraging data and student success.

Kentucky is focused on the right issues but will need to be aggressive to meet their goals. Additionally, Kentucky is a national leader in two regards: 1) their data and data infrastructure and 2) the leadership of Dr. Thompson and the CPE team.

University and College Presidents

There was unanimous agreement by the Presidents that the 2016-2021 strategic agenda met the needs of Kentucky and higher education.

No priorities were identified as missing, but nine topics were identified as needing more focus/detail or were unsuccessful. The topics mentioned most frequently were: 1) P-12 Partnerships, 2) Adult Learners, 3) Transfers, and 4) Underserved Populations.

In addition, several suggestions were made to improve the agenda, which primarily included refining the number of strategies and more clearly defining responsibilities between CPE and the institutions.

Broadly, the Strategic Agenda aligned with campus plans, and there were no areas of misalignment identified. Some presidents noted: 1) prioritizing may be different at the campus level, 2) not all aspects fully applied to them, and 3) how they achieve the goals and objectives may be different.

The group identified ten metrics that need to be revisited, including diversity, which was identified by two presidents and two missing metrics, innovation, and underprepared students. Several presidents also commented on performance-based funding and the need to do a collaborative review with the institutions.

Broad categories emerged as areas of focus in the next Strategic Agenda, and the top four areas were: 1) Affordability/Financial Access, 2) Recruitment, 3) Collaborative, Streamlined Approach, and 4) Technology.

Appendix: Participants

Executive Interviews

Elected and State Officials

Jacqueline Coleman
Lieutenant Governor

Jason Glass
Commissioner of Education

Regina Huff
Representative

Robert Stivers
Senate President

James Tipton
Representative

National Organizations

Jeremy Anderson
Education Commission of the States

Rob Anderson
State Higher Education Executive Officers Association

Thomas Brock
Community College Research Center

Alex Chough
National Council for Community and Education Partnerships

Michael Collins
Jobs for the Future

Kim Cook
National College Attainment Network

Matt Gandal
Education Strategy Group

Debra Humphreys
Lumina Foundation

Rebecca Martin
National Association of System Heads

Stephen Pruitt
Southern Regional Education Board

Yolanda Watson Spiva
Complete College America

Henry Stoever
Association for Governing Boards

Belle Wheelan
Southern Association of Colleges and Schools

Amanda Winters
National Governors Association

University and College Presidents

Neeli Bendapudi
President | University of Louisville

Christopher Brown
President | Kentucky State University

Tim Caboni
President | Western Kentucky University

Eli Capilouto
President | University of Kentucky

Paul Czarapata
Interim President | Kentucky College & Technical System

Robert Jackson
President | Murray State University

David McFaddin
President | Eastern Kentucky University

Jay Morgan
President | Morehead State University

OJ Oleka
President | Association of Independent Kentucky Colleges and Universities

Ashish Vaidya
President | Northern Kentucky University

Focus Groups

Rosz Akins
Sarah Ancel
Courtney Andrews
Deborah Aparicio
Elizabeth Baker
LaShawn Barber
Maria Bella
Matt Bergman
Matt Berry
Colby Birkes
Angela Black
Brigitte Blom Ramsey
Bruce Brooks
Bruce Brooks
Rochelle Brown
Bonita Brown
Leslie Brown
Leslie Brown
Ilona Burdette
Eddie Campbell
David Carpenter
Priya Chandrashekhar
Penny Christian
Doug Cleary
Roger Cleveland
Buddy Combs
Sara Conwell
Scott Cook
Laurie Couch
Lisa Cox
Alicia Crouch
Tonya Crum
Paul Czarapata
Cody Davidson
Beth Davisson
Kim Dolan
Kim Drummond
Kim Drummond
Jackie Dudley
Cami Duffy
Mason Dyer
Larry Ferguson
Wayne Fielder
Wayne Fielder
Renee Fister
Mary Fister-Tucker
Jim Flynn
Wendell Followell
Tim Forde
Jennifer Fraker
Jennifer Fraker
Kristina Gamble
Victoria Garcia
Natalie Gibson
Jessica Gibson
Amy Glasscock
Bob Goldstein
Lori Gonzalez
Rick Graycerek
Ryan Green
Mary Gwen Wheeler
Amanda Hale
Rob Hale
Mike Hales
Robert Hayes
Tuesdi Helbig
Larry Holloway
David Horseman
David Horseman
Gene Hutchins
Ashley Ireland
Tiffany Jackson
Chris Jensen
Felecia Johnson
Faye Jones
Logan Justice
Shauna King-Simms
Jaqueline Korengal
Dallas Kratzer
Brendan LeHane
Mel Letteer
Sarah Levy
Teresa Lindgren
John Lyons
Michael Marshall
Tom Martin
Stephanie Mayberry
Haley McCoy
Shaun McKiernan
Shaun McKiernan
Shannon Means
Eyouel Mekonnen
Luke Mentzer
LaKisha Miller
Bethany Miller
Shambra Mulder
Ebony Muldrow
Travis Muncie
Travis Muncie
Abdou Ndoye
Amy Neal
Laura Negron
Aaron Nethery
Don Offutt
Dawn Offutt
Dawn Offutt
Perry Papka
Sue Patrick
Darryl Peal
Robert Pervine
Jerry Pogatshnik
Kristi Putnam
Missy Ross
Lisa Rudzinski
Greg Russell
Amy Samples
Jenny Sawyer
Beverly Schneller
Beverly Schneller
Scott Secamiglio
Robert Staat
Cheryl Stevens
Abigail Stewart
Bridgett Strickler
Ella Strong
Jen Timmerman
Tim Todd
Janna Vice
Reneau Waggoner
Annie Weber
Gregory Wieland
Jennifer Wies
Emily Wiley
Beth Willey
Kris Williams
Kris Williams
Ralph Wolff
Lu Young
Noah Young
Melissa Young
Melissa Young
Sara Ziegler

Interviewers/Facilitators

Stefanie Ashley & Sarah Gilbert
Facilitation Center at Eastern Kentucky University

2022-30 Statewide Strategic Agenda Framework
DRAFTED STATEMENTS FOR DISCUSSION **JUNE 8, 2021**

Current Vision: Kentucky will experience greater prosperity and a higher quality of life through increased educational attainment, workforce readiness, research, and innovation.	**Draft Vision 2022-30:** Kentucky will be a national leader in building a strong, sustainable and equitable economy through increased educational attainment and affordable, high-quality postsecondary programs.
Current Mission: Kentucky's postsecondary system enhances the health and well-being of our citizens by preparing students to create and apply new knowledge and excel in a global economy and culture.	**Draft Mission 2022-30:** Kentucky's postsecondary system prepares students to be lifelong learners and excel in a diverse, inclusive, knowledge-based economy. Through academic programs, research, and public service, postsecondary education drives innovation, breaks the cycle of generational poverty and improves quality of life
Current Values: • Academic excellence and student success • Broad access to adult and higher education, both powerful tools to combat poverty • Inclusion, equity, and diversity. • Postsecondary education's ability to catalyze economic and community development. • Adequate funding for postsecondary education as a critical investment in Kentucky's future. • Collaboration and mutual respect among all postsecondary providers and partners. • Business and community partnerships • Accountability, transparency, and fiscal stewardship.	**Draft Values 2022-30:** • Academic quality and excellence • Affordability and accessibility • Inclusion, equity and diversity • Innovation • Strategic business and community partnerships • Transparency and accountability • Collaboration over competition • Comprehensive student support (academic, social and emotional) • Efficiency • Systemic thinking

KY Higher Education Vision

CURRENT:

Kentucky will experience greater prosperity and a higher quality of life through increased educational attainment, workforce readiness, research, and innovation.

PROPOSED:

Kentucky will be a national leader in building a strong, sustainable and equitable economy through increased educational attainment and affordable, high-quality postsecondary programs.

KY Higher Education Mission

CURRENT:

Kentucky's postsecondary system enhances the health and well-being of our citizens by preparing students to create and apply new knowledge and excel in a global economy and culture.

PROPOSED:

Kentucky’s postsecondary system prepares students to be lifelong learners and excel in a diverse, inclusive, knowledge-based economy. Through academic programs, research, and public service, postsecondary education drives innovation, breaks the cycle of generational poverty and improves quality of life.

KY Higher Education Values

CURRENT:

- Academic excellence and student success
- Broad access to adult and higher education, both powerful tools to combat poverty
- Inclusion, equity, and diversity.
- Postsecondary education's ability to catalyze economic and community development.
- Adequate funding for postsecondary education as a critical investment in Kentucky's future.
- Collaboration and mutual respect among all postsecondary providers and partners.
- Business and community partnerships
- Accountability, transparency, and fiscal stewardship.

PROPOSED:

- Academic quality and excellence
- Affordability and accessibility
- Inclusion, equity and diversity
- Innovation
- Strategic business and community partnerships
- Transparency and accountability
- Collaboration over competition
- Comprehensive student support (academic, social and emotional)
- Efficiency
- Systemic thinking