Brothers, Sheila C.

From: Cramer, Aaron M.
Sent: Saturday, December 14, 2019 6:52 AM
To: Bird-Pollan, Jennifer; Brothers, Sheila C.; Ett-Mims, Joanie; Woolery, Stephanie L.
Cc: Badurdeen, F F.
Subject: NEW MS: Supply Chain Engineering
Attachments: New Masters Deg Pgm Form-Final-SCE (December 2019).pdf

Proposed New MS in Supply Chain Engineering

This is a recommendation that the University Senate approve, for submission to the Board of Trustees, the establishment of a new MS degree: Supply Chain Engineering, in the Department of Mechanical Engineering within the College of Engineering.

Rationale: There is a national skills gap and demand for professionals in supply-chain-related careers. Demand in this area is reported to exceed supply by six to one. In Kentucky alone, there were more than 6,000 job postings for supply-chain positions in the previous year. There are very few similar programs, and the most comparable at Georgia Tech is not oriented towards working professionals. This two-year, non-thesis program, to be offered in an online formatted, has been developed in cooperation with the Gatton College of Business and Economics. The program features nine hours of common core courses (shared with the forthcoming proposed MS in Supply Chain Management program), 15 hours of Engineering-specific core courses, three elective hours, and three hours of capstone industry project. An initial cohort of 10 students followed by steady-state enrollment of 15 students is anticipated.

Aaron

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Office of Strategic Planning and Institutional Effectiveness (OSPIE). *The new program approval process begins when a contact persons submits a "Notification of Intent" (NOI) and substantive change checklist (available HERE) to OSPIE. Units have six months from the point of NOI submission to the time when the completed proposal is approved by Senate. After the NOI is submitted, a contact person should begin working to complete this form. Contact persons should work with OSPIE to identify the program's degree designation and CIP, as well as to solicit a letter of administrative feasibility from the Provost (per SR 3.2.3.A.2).*

Pre-proposal. *The CPE requires that a pre-proposal be submitted after a proposed program has achieved approval at the college level. Answers to questions identified with a * by the question number on this form will be used by OSPIE staff to submit the pre-proposal to the CPE (Council on Postsecondary Education).*

Form structure. *This form has two sections. The first half (white background) contains information required by the University Senate and Registrar's office and the second half (beige/brown background) contains information required by two external entities, the CPE and SACSCOC (Southern Association of Colleges and Schools Commission on Colleges). Although only the first half is required for University Senate approval, every question must be answered to receive CPE approval. Please do not leave any area blank, but instead write "not applicable" wherever that is the appropriate response.*

Approval process. *Once approved at the college level, your college will send the proposal to the appropriate Senate academic council (possibly HCCC and/or GC) for review and approval. Once approved at the academic council level, the academic council will send your proposal to the Senate Council office for additional review via a committee and then to the SC and University Senate. (The contact person listed on the form will be informed when the proposal has been sent to committee and other times as appropriate.) Once approved by the Senate, the Senate Council office will submit the proposal for it to be placed on an agenda for the Board of Trustees. After approval by the Board, OSPIE will ensure the proposal is submitted to the CPE for final approval. Generally, a new program proposal must have received approval from the Senate by early spring (February or March) in order for the new program to be effective for the following fall semester.*

INFORMATION REQUIRED BY UNIVERSITY SENATE	
1. Basic Information: Program Background and Overview	
1a	Home College: Engineering
1b	Home Educational Unit (school, department, college[1]): *Mechanical Engineering*
1c*	Office of Strategic Planning and Institutional Effectiveness (OSPIE) (Please contact OSPIE (OSPIE@L.uky.edu) for help with questions in this section.)
	Date of Contact with OSPIE: 11/29/2018
	☒ Appended to the end of this form is a PDF of the reply from OSPIE.
	☐ Appended to the end of this form is a letter of administrative feasibility from the Provost.
	☒ Appended to the end of this form is a letter(s) of administrative feasibility from the dean(s) of the college(s) offering the degree.
	CIP Code (confirmed by OSPIE): 14.3501

[1] Only interdisciplinary graduate degrees may be homed at the college level.

	Degree Type (MA, MS, etc.)[2] : MS		
	Is this degree designation on the CPE's list of degree designations[2]?	☒ Yes	☐ No
	If "No," please provide an explanation for OSPIE's use in external reporting purposes.		

1d*	Major Name (Biology, Finance, etc.): *Supply Chain Engineering*		
1e	Is there a specialized accrediting agency related to this program?	Yes ☐	No ☒
	If "Yes," name:		
	Do you intend to seek accreditation from this agency?	Yes ☐	No ☐
1f	Was this particular program ever previously offered at UK but subsequently suspended?	Yes ☐	No ☒
	If "Yes," describe. (*300 word limit*)		

1g*	Requested effective date:	☐ Fall semester following approval.	OR	☒ Specific Date[3]:*Fall 20 20*	
1h*	Anticipated date for granting first degree(s): *Summer2022*				
1i*	Contact person name: *Fazleena Badurdeen*	Email: *badurdeen@uky.edu*		Phone: *859-323-3252*	

2. Program Overview

2a*	Provide a brief description of the proposed program. *(300 word limit)*
	This two-year, 30 credit hour, online MS in Supply Chain Engineering (SCE) program is targeted at teaching students the multi-disciplinary knowledge and skills necessary to design, evaluate, and improve transformational and logistical functions in supply chains. *The SCE program and the new Supply Chain Management (SCM) MS program, proposed by the Gatton College of Business & Economics, are designed as two independent degree programs sharing a set of common core courses (see Appendix for the structure of the two programs).* *SCE is a non-thesis degree that shares three common core courses (9 credit hours) with SCM, has five Engineering core courses (15 credit hours) and one elective course (3 credit hours) from a list of recommended courses, and ends with a capstone industry project (3 credit hours). The three common core courses are co-designed by faculty from both colleges and will enroll both SCE and SCM students simultaneously; two of the core courses will be taught by faculty from the Gatton College and one by faculty from the College of Engineering. The capstone industry project will be common to both the SCE and SCM programs and will be co-advised by faculty from the two Colleges. It will allow multi-disciplinary teams of students from the two Colleges to work collaboratively on solving real-world supply chain problems proposed by industry partners.* *Students in the SCE program will start in the Fall semester and complete two courses each in two consecutive Fall and Spring semesters. These courses will equip students with essential domain knowledge and skills necessary for supply chain decision making. Students will take the capstone industry project, as well as the elective course, in the Summer of the second year for degree completion.*
2b	List the program objectives of the proposed program. These objectives should deal with the specific institutional

[2] Visit http://dataportal.cpe.ky.gov/cpedegreedesignations.aspx for the CPE's list of approved degree designations.
[3] Programs are effective the semester following approval. No program will be made effective unless all approvals, up through and including Board of Trustees and CPE approval, are received.

	and societal needs that the program will address, such as how students will benefit from the program, both tangibly and intangibly. (Please note that "program objectives" are different from "student learning outcomes.") *(300 word limit)*
	The objective of the SCE program is to prepare students to apply scientific and mathematical principles to design, evaluate and improve transformational and logistical functions within an enterprise and among its partners across the supply chain. The specific program objectives are that, upon graduation, program graduates will: 1. Obtain employment and advance in careers appropriate to an advanced technical degree in Supply Chain Engineering. 2. Be leaders in the industrial sector or be pursuing further graduate study. 3. Use their science, technical, and professional skills to make a positive impact on society and the world. 4. Engage in continued professional development and life-long learning.
2c*	List the intended student learning outcomes (SLOs) for the proposed program. Address one or more of the five areas of learning: 1. broad, integrative knowledge; 2. specialized knowledge; 3. intellectual skills; 4. applied learning; and 5. civic learning. (*300 word limit) (More detailed information will be addressed in a subsequent question.)*
	The student learning outcomes for the proposed program are: • *Demonstrate an understanding of supply chain fundamentals including sourcing and procurement, manufacturing process, transportation and logistics, and customer/ supplier relationship management.* • *Demonstrate the ability to work in a multidisciplinary team-based environment to identify and solve contemporary supply chain problems.* • *Demonstrate the ability to successfully use advanced mathematical modeling and simulation tools, as well as contemporary programming languages, to design and analyze -complex global supply chains.*
2d	Describe the rationale and motivation for the program. Give reference to national context, including equivalents in benchmark institutions. *(150 word limit)*
	Several reports have highlighted the national skills gap and demand for trained professionals in supply chain-related careers. One report estimates that demand for professionals in this area will exceed supply by a ratio of six to one. The retiring baby boomers are projected to leave a large number of unfilled jobs in this area. In addition, the importance of a skilled, technically savvy workforce capable of designing, installing, and improving complex supply chains to operate in environments with technologies such Internet of Things (IoT), digitalization, blockchain, etc., has also been well publicized. An assessment of job postings in the states surrounding Kentucky (through Burning Glass) revealed there were more than 6,000 job postings in supply chain-related careers in the last 12 months and a projected 7% growth jobs over the next eight years. Therefore, the establishment of the MS in SCE degree program at UK is both compelling and timely. *The only existing Supply Chain Engineering MS program in the nation is at the Georgia Institute of Technology (a full-time program that does not cater to working professionals). The Ohio State University offers a Master of Business Logistics Engineering while MIT offers a Master of Engineering (MEng.) and a Master of Applied Science (MASc) in Supply Chain Management degree. Therefore, by offering the proposed MS in SCE UK will be uniquely positioning itself to produce graduates who can contribute to the workforce in an area of national need. Further, the online delivery of the SCE program will increase accessibility to interested students across the nation and to those currently employed in supply chain careers.*
2e	Describe the proposed program's uniqueness within UK. *(250 word limit)*
	The program at UK that is related to the proposed MS degree in SCE is the online Manufacturing Systems Engineering (MFS) MS program. However, these two programs are quite different from each other. The MFS degree focusses on designing products, managing the manufacturing processes (such as machining) and

	designing and operating the manufacturing system. It does not have any emphasis on designing, installing, or improving the extended supply chain that covers upstream and downstream partners beyond the enterprise. The analytical and simulation modeling tools that will form an integral part of the SCE degree curriculum are also not covered in the MFS degree program. Another unique aspect of the SCE degree that makes it different from the MFS degree is the common core courses (12 credit hours) it shares with the new SCM degree proposed by the Gatton College of Business & Economics. These core courses will provide SCE students the multi-disciplinary knowledge and capabilities necessary to be successful in supply chain careers.		
2f	Describe the target audience. *(150 word limit)*		
	The target audience for the MS in SCE will be those with an ABET accredited undergraduate degree in Engineering. Applicants with an undergraduate degree in a closely related area will also be considered with preparatory courses to be completed. The program will be useful for students graduating with an undergraduate degree in these areas and expecting to pursue careers in the supply chain domain. Further, due to the practical, industry-relevant nature of the curriculum proposed for the SCE degree, the program will be highly attractive to those currently employed in supply chain-related careers interested in further education to advance their analytical capabilities.		
2g*	Does the program allow for any concentrations?	Yes ☐	No ☒
	If "Yes," name the concentration(s). *(Specific course requirements will be described in Section A, part 7.)*		
	Concentration #1:		
	Concentration #2:		
	Concentration #3:		
2h	Are necessary resources available for the proposed new program? *(A more detailed answer is requested in Section A, part 4.)*	Yes ☐	No ☒
2i	Describe how the proposed program will be administered, including admissions, student advising, retention, etc. *(150 word limit)*		
	The MS in SCE will be housed in and administered by the Mechanical Engineering department. The day-to-day operation of the program will be the responsibility of the Director of Graduate Studies for the SCE program supported by a Graduate Committee consisting of 3-4 faculty members. The Graduate Committee will be a sub-set of the faculty of record to whom the oversight of the degree will be delegated. The SCE Graduate Committee will be responsible for establishing the admission process, student advising, and planning and assessment, to ensure student success. A Graduate Student Coordinator (staff) will also be appointed to manage the day-to-day coordination of matters relating to the SCE students.The DGS and members of the SCE Graduate Committee will be selected from members of the faculty of record. The DGS of the SCE program will work closely with the Director of the proposed Supply Chain Management MS program (in Gatton College of Business & Economics) to coordinate the offering of courses shared between the two programs.		
2j	Are multiple units/programs collaborating to offer this program?	Yes ☒	No ☐
	If "Yes," please discuss the resource contribution(s) from each participating unit/program. *(150 word limit) (Letters of support will be addressed in Part A, section 7.)*		
	The faculty from the departments of Mechanical Engineering & Civil Engineering in the College of Engineering (COE) and the department of Marketing and Supply Chain in the Gatton College of Business and Economics		

	(B&E) will provide the majority of instruction and student advising for the SCE degree. Each student will take 6 courses from the instructors in the COE and 2 courses from those in B&E. Faculty from the two colleges will also serve as co-advisors for the Capstone Industry Projects. The courses listed as electives are existing courses offered by different departments/colleges.		
2k	List all UK programs[4] that the proposed program could be perceived as replicating. Give a rationale for why this is not duplication, or is a necessary duplication. *(250 word limit)*		
	The existing online MFS degree focusses on designing products, managing the manufacturing processes (such as machining) and designing and operating the manufacturing system. It does not have any emphasis on designing, installing, or improving the extended supply chain that covers upstream and downstream partners beyond the enterprise. The analytical and simulation modeling tools that will form an integral part of the SCE degree curriculum are also not covered in the MFS degree program. The SCE degree also differs from the proposed Supply Chain Management (SCM) degree. While both the SCE and SCM degrees will have a set of common core courses, the SCE degree focuses more on developing students' knowledge and skills in analytical methods; on the other hand, the SCM degree will focus on instilling managerial (and more soft) skills. Therefore, the proposed SCE degree will not be duplicating any existing or currently proposed degree at UK.		
2l	Will the faculty of record for the proposed new master's degree be the graduate faculty of the department/school offering the proposed new degree?	Yes ☒	No ☐
	If "No," please describe the faculty of record for the proposed master's program, including: selection criteria; term of service; and method for adding/removing members. Will the existing director of graduate studies (DGS) in the department/school be the DGS for this proposed master's degree?		
2m	Will the program have an advisory board[5]?	Yes ☐	No ☒
	If "Yes," please describe the standards by which the faculty of record will select members of the advisory board, the duration of service on the board, and criteria for removal. *(150 word limit)*		
	If "Yes," please list below the number of each type of individual (as applicable) who will be involved in the advisory board.		
		Faculty within the college who are within the home educational unit.	
		Faculty within the college who are outside the home educational unit.	
		Faculty outside the college who are within the University.	
		Faculty outside the college and outside the University who are within the United States.	
		Faculty outside the college and outside the University who are outside the United States.	
		Students who are currently in the program.	
		Students who recently graduated from the program.	
		Members of industry.	
		Community volunteers.	
		Other. Please explain:	
		Total Number of Advisory Board Members	
3. Delivery Mode			**UK DLP and eLearning Office [6]**

[4] You must include a letter of support from any other program's home unit. Please convert the letter to a PDF and append to the end of this form.

[5] An advisory board includes both faculty and non-faculty who are expected to advise the faculty of record on matters related to the program, e.g. national trends and industry expectations of graduates.

3a*	Initially, will any portion of the proposed program's core courses be offered via distance learning[7]?			Yes ☒	No ☐
	If "Yes," please indicate below the percentage of core courses that will be offered via distance learning.				
(check one)	1% - 24% ☐	25% - 49% ☐	50% - 74% ☐	75 - 99% ☐	100% ☒
	NOTE: Programs in which 25% or more of the program will be offered via distance learning may need to submit a substantive change prospectus to SACS. Please contact institutionaleffectiveness@uky.edu for assistance. *The prospectus is required by SACS, but it is NOT required for Senate review.*				
3b*	If *any* percentage of the program will be offered via the alternative learning formats below, check all that apply, below.				
	☒	Distance learning.			
	☒	Courses that combine various modes of interaction, such as face-to-face, videoconferencing, audio-conferencing, mail, telephone, fax, email, interactive television, or World Wide Web.			
	☒	Technology-enhanced instruction.			
	☒	Evening/weekend/early morning classes.			
	☐	Accelerated courses.			
	☐	Instruction at nontraditional locations, such as employer worksite.			
	☐	Courses with multiple entry, exit, and reentry points.			
	☐	Modularized courses.			
3c	Give pedagogical rationale for the use of alternative delivery modes in the proposed program. Consider the aspects below and elaborate as appropriate. *(200 word limit)* • Synchronous and asynchronous components. • Balance between traditional and non-traditional aspects. • Hybrid elements.				
	The SCE program will use a combination of delivery modes to disseminate course materials to students enrolled in the program. It is anticipated that the majority of the students in the SCE program will be employed full-time. The program also aims to attract students outside Lexington, KY and other states where a majority of supply chain career professionals are expected to be located. As such, using face-to-face, on-campus course delivery will not be effective. The SCE program courses will be delivered mostly online. Pre-recorded lecture materials will be made available to students for asynchronous review; synchronous discussion sessions will be planned to increase engagement and dialogue. The SCE program includes a core capstone industry project to be carried out in multi-disciplinary teams of students from both the SCE (engineers) and SCM (managers) programs.				
4. UK Resources					
4a*	Will the program's home educational unit require new or additional faculty?			Yes ☒	No ☐
	If "Yes," provide a plan to ensure that appropriate faculty resources are available, either within UK or externally, to support the program. Note whether the new and additional faculty will be part-time or full-time faculty. If "No," explain why. *(150 word limit)*				
	If "Yes," when will the faculty be appointed? *(150 word limit)*				
	Existing faculty within different departments have the expertise to teach courses in the program. However, all faculty currently have full teaching loads, delivering courses in existing programs. While they can be engaged in teaching some courses in the short term (as overload), new faculty hiring will be required for the success and growth of the SCE program. The ME department will require one tenure-track faculty and one non tenure-track				

[6] For questions about alternative delivery modes, please contact UK's Distance Learning Programs and e-Learning office (http://www.uky.edu/DistanceLearning/).

[7] Per the Southern Association of Colleges and Schools Commission on Colleges (SACS) definition of distance education, distance education is a formal educational process in which the majority of the instruction (interaction between students and instructors and among students) in a course occurs when students and instructors are not in the same place. Instruction may be synchronous or asynchronous.

	faculty (lecturer/ part-time instructor) to deliver the new courses. One part-time instructor will also be recruited to teach in the program. *A letter from the College of Engineering Dean expressing commitment to invest the required resources for faculty hiring is attached.*		
4b	Will the program's home educational unit require additional non-faculty resources, e.g. classroom space, lab space, or equipment?	Yes ☒	No ☐
	If "Yes," provide a brief summary of additional non-faculty resources that will be needed to implement this program over the next five (5) years. If "No," explain why. *(150 word limit)*		
	The program will require a Graduate Student Coordinator to manage all day-to-day aspects related to communication with potential students, attending to administrative requirements for enrolled students and assisting faculty with student/course-related aspects. Developing courses for online delivery requires a significant time and effort by faculty must be provided incentives to do so. To ensure high-quality student learning experiences through the online platform, online simulations/games must be developed in place of hands-on learning exercises. Financial resources will be required to support these activities. Resources will also be required for marketing the new program through various channels. No significant classroom space will be required as the majority of the program courses will be delivered online.		
4c	Will the program include courses from another educational unit(s)?	Yes ☒	No ☐
	If "Yes," list the courses and identify the other educational units and subunits that have approved the inclusion of their courses. *(150 word limit)*		
	The program will include two courses offered by the department of Marketing and Supply Chain. They are: *MKT 630 Supply Chain Strategy* *MKT 635: Logistics Management* *In addition, SCE 610: Big Data and Supply Chain Analytics is a course offered by Civil Engineering that will be cross-listed as a SCE course and included in the program.* *Support letters from the department of Marketing and Supply Chain as well as Civil Engineering approving the inclusion of their courses is included as an attachment.*		
	If "Yes," append to the end of this form a letter of support from the appropriate educational unit chair/director from whose unit individual courses will be used. A letter must include the following: • Demonstration of true collaboration between multiple units[8]; • Impact on the course's use on the home educational unit; and • Verification that the chair/director has consent from the faculty members of the unit.		

[8] Show evidence of detailed collaborative consultation with such units early in the process.

4d	Fill out the faculty roster below for full-time and part-time faculty teaching major core courses in the proposed program.

NAME	COURSES TAUGHT	ACADEMIC DEGREES AND COURSEWORK	OTHER QUALIFICATIONS AND COMMENTS
List name & identify faculty member as "F" (full-time) or "P" (part-time).	Include term; course prefix, number and title; & credit hours. Identify courses as D, UN, UT or G.	List relevant courses taught, including institution and major.	Note qualifications and comments as they pertain to course taught.
Randy Siever (P)	SCE 630 SC Strat (G)	Master of Busines Administration	Currently teaches the Supply Chain Strategy course in the Gatton MBA program
New Faculty Hire1 (F)	SCE 631 Prod & Op Mgt (G)	PhD in Industrial Engineering or closely related area	
New Faculty Hire1 (F)	SCE 604 Sys. Opt & Sim (G	--same as above --	
Fazleena Badurdeen (F)	SCE/MFS 503 Lean Mfg (UG)	PhD in Integrated (Industrial and Mechanical Engineering), Master of Business Administration	Has taught the MFS 503 course for more than ten years
C. H. Chung (F)	SCE 635 Logis Mgt (G)	PhD in Operations Management	
Gregory Erhardt (F)	SCE 610 Big D & SC Ana(G)	PhD in Advanced Spatial Analysis, MS in Civil Engineering	Research in transportation network modeling, application of big data to transportation
Doug Kreis (P)	SCE 632 Strat SC Des (G)	PhD Civil Engineering, MS in Supply Chain Management	Engaged in supply chain-related research through the Kentucky Transportation Cabinet
New Lecturer Hire1 (F)	SCE614 Sus P Sys & SC (G)	PhD in Indsutrial Engineering or a closely related area	Industry experience in the supply chain domain
New Lecturer Hire1 (F)	SCE 740 Industry Pro (G)	- same as above --	--same as above --

FT = full time PT= part time	D = developmental UN = undergraduate nontransferable UT = undergraduate transferable G = graduate

5. Assessment – Program Assessment and Student Learning Outcomes (SLOs)	
5a	Referring to program objectives, student benefits, and the target audience (questions 2b and 2f), explain how the *program* will be assessed, which is different from assessing student learning outcomes. Include how the faculty of record will determine whether the program is a success or a failure. List the benchmarks, the assessment tools, and the plan of action if the program does not meet its objectives. *(250 word limit)*
	The objective of this program is to prepare students to apply scientific and mathematical principles to design, install and improve all transformational and logistical functions within an enterprise and among its partners across the supply chain. The specific program objectives are that, upon graduation, program graduates will: *1. Obtain employment and advance in careers appropriate to an advanced technical degree in Supply Chain Engineering.* *2. Be leaders in the industrial sector or be pursuing further graduate study.* *3. Use their science, technical, and professional skills to make a positive impact on society and the world.* *4. Engage in continued professional development and life-long learning.* *These program-level outcomes will be assessed using data gathered from job placement data and alumni surveys to determine, among other information, alumni satisfaction with the professional skills acquired in the program in support of objectives 1-4. The survey will be administered and analyzed by the graduate committee every three years. Together with the alumni survey data, the graduate committee will also review secondary measures of the overall quality of the program: the appropriateness of core courses in their support of objectives 1-4; the relevance of final projects to objectives 1-4; time-to-graduation; as well as enrollment numbers and GPA.*
5b	*(related to section 15)* Append an assessment plan[9] for the SLOs to the end of this form. *(Click HERE for a sample assessment plan.)*
5c	Explain how the curriculum achieves the program level student learning outcomes by describing the relationship between the overall curriculum or the major curricular components and the program objectives. *(300 word limit)*
	Three areas of fundamental concepts in supply chain engineering and management are the focus in the SCE program which are: sourcing & procurement, manufacturing operations, and transportation & logistics. The Student Learning Outcomes (SLOs) for the program are to: 1)Demonstrate an understanding of supply chain fundamentals including sourcing and procurement, manufacturing process, transportation and logistics, and customer/ supplier relationship management, 2) Demonstrate the ability to work in a multidisciplinary team-based environment to identify and solve contemporary supply chain problems, and 3) Demonstrate the ability to successfully use advanced mathematical modeling and simulation tools, as well as contemporary programming languages, to design and analyze complex global supply chains. The overall curriculum focuses on enhancing the: students' understanding of supply chain fundamentals, the ability to work in a multidisciplinary team-based environment, and the application of advanced mathematical modeling and simulation tools. The courses in the program are designed to provide students the knowledge and skills necessary for each of these. For example, the course of SCE 630: Supply Chain Strategy will cover the supply chain fundamentals; SCE 631: Production and Operations Management course will cover more specific concepts related to managing production and other operations (understanding level), and teach students the concepts and tools necessary for modeling and solving problems in this domain. The SCE 740 Industry Project course will focus on developing students' capability to apply the knowledge gained through other courses to solve practical problems in the supply chain domain by working in a multi-disciplinary team environment. More detailed relationships between the curriculum and the program objectives are listed in course map.

[9] An assessment plan is typically a tabular grid that illustrates the artifacts, rubrics, assessment team, and periods of assessment for the SLOs.

5d	Append a PDF of the program's course map[10] to the end of this form. *(Click HERE for a sample curricular map.)*
5e	*(related to 2c)* Based on the SLOs from question 2c, which components will be evaluated, i.e. course mapping? For each student learning outcome identify in which courses it is covered in the curriculum and note whether employers, students, alumni, and/or faculty outside of the program were involved in the development of student learning outcomes. *(300 word limit).*
	Given i) three SLOs at both course-level and program-levels, ii) nine core courses, and iii) four means to evaluate SLOs, specifically as Introduced, Reinforced, Emphasized, and Applied, *SLO 1 will be Introduced in SCE503, SCE604, and SCE631, Reinforced in SCE610, SCE632 and SCE635, Emphasized in SCE614 and SCE630, Applied in SCE631 and SCE740;* *SLO 2 will be Introduced in SCE630 and SCE631, Reinforced in SCE614 and SCE632, Emphasized in SCE610 and SCE635, Applied in SCE604, SCE631 and SCE740;* *SLO 3 will be Introduced in SCE503 and SCE604, Reinforced in SCE604 and SCE630, Emphasized in SCE630 and SCE631, Applied in SCE610, SCE632, SCE635 and SCE740.* *The team of faculty from the College of Engineering and Gatton College of Business & Economics were involved in developing SLOs 1, 2 and 3 at the course-level.* *In addition to the team of faculty, alumni and industry experts were involved in developing SLOs 2 and 3 at the program-level.*
5f	When will components be evaluated? Identify the review cycle for each student learning outcome. (e.g, every semester or each year) *(150 word limit)*
	Given Summer 2022 as the anticipated date for granting first degrees, and given six assessment measures (AMs), AMs 1-3 relate more to courses and will be evaluated at the end of every semester based on the courses offered, AMs 4 and 5 relate more to the program and will be evaluated annually, and AM 6 also relates more to the program but will be evaluated once in every three years, based on job placement data and alumni surveys. *As all of three SLOs are achieved according to courses offered, they will be evaluated in semesters. However, SLOs 2 and 3 are also at the program-level and will be evaluated annually based on accumulated data in semesters.*
5g	When will the data be collected? (This may or may not be different from when the assessment is *conducted*.) *(150 word limit)*
	Data for SLOs at the course-level, specifically AMs 1-3, will be collected at the end of each semester through TCE at UK. *Data for SLOs at the program-level, specifically, AMs 4 and 5 will be collected by semester but summarized annually through registrar information at UK, and AM 6 will be collected every three years through job placement data and alumni surveys.*
5h	How will the data be collected? *(150 word limit)*
	At the course-level, data for SLOs will be collected through Teacher and Course Evaluations (TCE) on Canvas at UK, and at the program-level, data will be collected through alumni surveys. Additional rubrics will be used to evaluate the Industry Project course that will be completed by the course instructors and/or faculty committee reviewing the student projects.

[10] Course mapping (or "curricular mapping") is a representation of how faculty intend to approach and assess each of the student learning outcomes identified for the courses for the degree program, with an emphasis on courses required for all degree candidates. It is a master chart that indicates which objectives are being met, to what extent, and how often. This identifies whether an objective is "introduced," "developed," and/or "mastered" within a given course; it may be helpful also to chart any classroom-based assessment measures used to demonstrate that claim.

5i	What will be the benchmarks and/or targets to be achieved? *(150 word limit)*
	Annual GPA will be used as benchmarks for SOLs at the course-level, and employment data for other disciplines will be used as benchmarks for SOLs at the program-level.
5j	What individuals or groups will be responsible for data collection? *(150 word limit)*
	Faculty members who teach courses will be responsible for data collection at the course-level, and the graduate committee will be responsible for data collection at the program-level.
5k	How will the data and findings be shared with faculty? *(150 word limit)*
	Data and findings at the course-level will be shared through TCE, and those at the program-level will be shared through graduate committee meetings.
5l	How will the data be used for making programmatic improvements? *(150 word limit)*
	TCE results will be helpful for instructors to tailor course contents according to student expectations at the course-level, and data at the program-level will be beneficial for the graduate committee to decide what courses to offer and in which semesters. The information will also be shared with the advisory board, as appropriate and feasible, to receive feedback and improve the program.
5m	What are the measures of teaching effectiveness? *(150 word limit)*
	GPA, student satisfaction, student enrollment in the program, and job placement.
5n	What efforts to improve teaching effectiveness will be pursued based on these measures? *(150 word limit)*
	Faculty members who teach courses will revise course contents, emphases in each topic, questions in assignments and quizzes. The graduate committee will communicate with industry and develop potential projects accordingly.
5o	What are the plans to evaluate students' post-graduate success? *(150 word limit)*
	A post-graduate survey will be sent to graduates of the program 3 years after their graduation date to determine whether three learning outcomes in 5c are deemed valuable in the student's post-graduate employment.

6. Miscellaneous	
6a	Is there anything else about the proposed program that should be mentioned? *(150 word limit)*
	N/A

7. Non-Course Requirements			
7a	Will the program require completion of a bachelor's degree from a fully accredited institution of higher learning?	Yes ☒	No ☐
	If "No," explain below. (*150 word limit*)		
	Admission to the program will require an ABET accredited degree in Engineering or a closely related area. Students having a degree in a closely related area may be required to take additional preparatory courses.		
7b	The Graduate School requires applicants to have an overall GPA of 2.75 on undergraduate work. Will the program have a higher undergraduate GPA requirement?	Yes ☒	No ☐
	If "Yes," describe below. (*150 word limit*)		
	The minimum GPA required for admission to the program will be 3.0. For eligible (based on 7a) students relevant work experience may be considered when the GPA is greater than or equal to 2.75 but less than 3.0		

7c	Will the proposed program include requirements for testing (e.g. GRE, GMAT, TOEFL) to be considered for admission?	Yes ☒	No ☐
	If "Yes," name each test and describe the specific requirements, scores, etc. below. (*150 word limit*)		
	TOEFL will be required for international students, as per the Graduate School requirements. GRE will not be required.		
7d	Will the program have a world language requirement?	Yes ☐	No ☒
	If "Yes," describe below. (*150 word limit*)		
7e	The Graduate School allows transfer of up to nine credits or 25% of course work. Please describe transfer credit limitations below for the proposed program. (*150 word limit*)		
	The program will follow the general Graduate School policies for credit transfer.		
7f	Will the program have a thesis requirement (Plan A)? (If "Yes," explain the requirements below. If "No," proceed to question 6g)	Yes ☐	No ☒
7g	Will the program have a non-thesis requirement (Plan B)? (If "Yes," explain the requirements below. If "No," proceed to question 6h)	Yes ☒	No ☐
	If "Yes," explain the requirements below.		
	Every student will be required to complete the capstone industry project.		
7h	Provide the final examination criteria.	Yes ☒	No ☐
	As part of the required course SCE 740 Industry Project, student teams will be required to provide a written project report accompanied by an oral defense to a faculty committee established according to Graduate School policies. Committee members examine the technical competency of students at the oral defense, which acts as the program final exam.		
7i	Describe termination criteria.	Yes ☒	No ☐
	Students must meet all requirements of the Graduate School. In particular, they must maintain a GPA of 3.0 or better. Students whose GPA falls under 3.0 are placed on probation; if they do not meet conditions set in the probation letter, they will be removed from the program.		

8. Course Requirements.

8a	Document the total credit hours required by level below. At least two-thirds of the minimum requirements for the master's or specialist degree must be in regular courses, and at least half of the minimum course requirements (excluding thesis, practicum, or internship credit) must be in 600- or 700-level courses.			
	400G-level:	500-level: *20%*	600-level: *70%*	700-level: *10%*
8b*	What is the total number of credit hours required for the degree?[11] (e.g. 24, 32)			*30*
	If an explanation about the total credit hours is necessary, use the space below. *(150 word limit)*			

[11] A non-thesis option (Plan B) requires that six or more graduate credit hours of course work be submitted in lieu of a thesis.

Use the grids below to list core courses, electives, courses for a concentration, etc.
Use the course title from the Bulletin or from the most recent new/change course form.

8c* **Program Major Core Courses.** These courses are required for all students in the program and include prerequisite courses. Check the appropriate box to describe the course as either "program core" or "prerequisite."

Prefix & Number	Course Title	Type of Course	Credit Hrs	Course Status[12]
SCE 630	*Supply Chain Fundamentals and Strategy*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 631	*Production and Operations Management*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 635	*Logistics Management*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 740	*Industry Project*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 503	*Lean Manufacturing Principles & Practices*	☒ Pgm Core ☐ Prerequisite	*3*	No Change
SCE 604	*Systems Optimization and Simulation*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 610	*Big Data & Supply Chain Analytics*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 614	*Sustainable Production Systems & Supply Chains*	☒ Pgm Core ☐ Prerequisite	*3*	New
SCE 632	*Strategic Supply Chain Design*	☒ Pgm Core ☐ Prerequisite	*3*	New
		☒ Pgm Core ☐ Prerequisite	*3*	New
		☐ Pgm Core ☐ Prerequisite		Select one....
		☐ Pgm Core ☐ Prerequisite		Select one....
		☐ Pgm Core ☐ Prerequisite		Select one....
		☐ Pgm Core ☐ Prerequisite		Select one....
		☐ Pgm Core ☐ Prerequisite		Select one....
		*Total **Core Courses** Credit Hours:*	*27*	

8d	Is there any narrative about prerequisite courses for the program that should be	Yes ☒	No ☐

[12] Use the drop-down list to indicate if the course is a new course ("new"), an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").

	included in the Bulletin? If "Yes," note below. (*150 word limit*)		
	The program will be of interest to students with any engineering background. Therefore, the program has no specific prerequisites other than the requirement of the ABET accredited BS degree in Engineering and the undergraduate GPA of 3.0.		
8e	Is there any narrative about core courses for the program that should be included in the Bulletin? If "Yes," note below.	Yes ☒	No ☐
	Every student must complete the following core courses, and an elective course, with a grade of B or better. *SCE 630: Supply Chain Strategy* *SCE 631: Production and Operations Management* *SCE 635: Logistics Management* *SCE 740: Industry Project* *SCE 503: Lean Manufacturing Principles and Practices* *SCE 604: Systems Optimization and Simulation* *SCE 610: Big Data & Supply Chain Analytics* *SCE 614 Sustainable Production Systems and Supply Chains* *SCE 632: Strategic Supply Chain Design*		
	Program Guided Electives[13] (Guided electives for all students in the program.)		
8f*	Does the program include any guided electives? (If "Yes," indicate and note the specific courses in the grid below. If "No," indicate and proceed to question 7i.)	Yes ☒	No ☐
8g*	Using the grid provided, list the guided electives below.		

Prefix & Number	Course Title	Credit Hrs	Course Status[14]
MGT 611	*Managing Effective Orgnizations*	*3*	No Change
MFS 606	*Global Issues in Manufacturing*	*3*	No Change
MFS 605	*Modeling, Simulation and Control for Manufacturing*	*3*	No Change
MFS 613	*Sustainability, Ethics and Leadership in Manufacturing Organizations*	*3*	No Change
MFS 526	*Lean Operations Management*	*3*	No Change
MFS 509	*Leadership for a Lean Enterprise*	*3*	No Change
			Select one....
			Select one....
			Select one....
			Select one....
	Total Credit Hours as Guided Electives:	*3*	

8h	Is there any narrative about guided electives courses that should be included in the	Yes ☐	No ☒

[13] Guided electives are available to all students in the program and are organized as groups of elective courses, from which a student chooses one (or two, or three, etc.).

[14] Use the drop-down list to indicate if the course will be newly proposed as a new course ("new"), if the course is an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").

	Bulletin? If "Yes," note below. (*150 word limit*)		
	Program Free Electives[15]. (Free electives for all students in the program.)		
8i*	Does the program include any free electives? (If "Yes," indicate and proceed to question 7j. If "No," indicate and proceed to 7l.)	Yes ☐	No ☒
8j*	What is the total number of credit hours in free electives?		
8k	Provide the free electives courses language that will be included in the Graduate School Bulletin. (*150 word limit*)		
	Courses for a program's concentration(s).		
	Click HERE for a template for additional concentrations[16].		
8l	Does the program include any concentrations? (If "Yes," indicate and proceed to question 7m. If "No," indicate and proceed to 7p.)	Yes ☐	No ☒
8m	Concentration name:		

Prefix & Number	Course Title (Check the appropriate box to describe the course as "a core course for the concentration" or "an elective course for the concentration.")		Credit Hrs	Course Status[17]
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core		Select one....

[15] Program free electives are available to all students in the program (regardless of any concentration(s)) and the choice of which course(s) to take is up to the student. Courses are not grouped but can be described as "student must take three courses at the 600-level or above."

[16] Append a PDF with each concentration's courses to the end of this form.

[17] Use the drop-down list to indicate if the course will be newly proposed as a new course ("new"), if the course is an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").

		☐ Elective		
		☐ Core ☐ Elective		Select one....
8n	Provide concentration-related language that should be included in the Graduate School Bulletin. (150 word limit)			
8o	Does the program have an additional concentration? (If "Yes," indicate and proceed to question 7p. If "No," indicate and proceed to 7r.)		Yes ☐	No ☐
8p	Concentration #2 Name:			
Prefix & Number	Course Title (Check the appropriate box to describe the course as "a core course for the concentration" or "an elective course for the concentration.")		Credit Hrs	Course Status[18]
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		☐ Core ☐ Elective		Select one....
		Total Credit Hours, Concentration #2:		
8q	Provide concentration-related language that should be included in the Graduate School Bulletin for the second concentration. (150 word limit)			
8r	Is there anything else about the proposed program that should be mentioned? *(150 word limit)*			

[18] Use the drop-down list to indicate if the course will be newly proposed as a new course ("new"), if the course is an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").

9. Degree Plan				
9a	Create a degree plan for the proposed program by listing in the table below the courses that a typical student would take each semester. Use the spaces for "Year 3" only if necessary. If multiple concentrations are available, click HERE for a template for additional concentrations. Append a PDF with each concentration's semester-by-semester program of study to the end of this form.			
	YEAR 1 - FALL:	*SCE 630 and SCE 631*	**YEAR 1 - SPRING:**	*SCE 635 and SCE 503*
	YEAR 2 - FALL :	*SCE 604 and SCE 610*	**YEAR 2 - SPRING:**	*SCE 614 and SCE 632*
	YEAR 3 - FALL:	*Year 2 Summer: SCE 740 and elective*	**YEAR 3 - SPRING:**	
9b	With reference to the degree plan above, explain how there is progression in rigor and complexity in the courses that make up the program. *(150 word limit)*			
	SCE students will complete three of the common (to SCE and SCM programs) core courses in the first year in the program. This will provide them a strong foundation on key concepts related to supply chain engineering. The courses designed to provide an in-depth knowledge on analytical and simulation tools and other advanced concepts necessary for sound supply chain decision making will be covered starting in the second year. In the final semester in the program (2nd year summer) students will work collaboratively in teams (with their SCM program counterparts) to apply the concepts learned through other courses to solve a real-world supply chain problem.They will also take one elective course during the last semester.			

10. Approvals/Reviews			
Information below does not supersede the requirement for individual letters of support from educational unit administrators and verification of faculty support (typically takes the form of meeting minutes).			
	Reviewing Group Name	**Date Approved**	**Contact Person Name/Phone/Email**
10a	(Within College) *In addition to the information below, attach documentation of department and college approval. This typically takes the form of meeting minutes but may also be an email from the unit head reporting department- and college-level votes.*		
	Department of Mechanical Engineering	*03/15/2019*	*Mike Renfro / 859-218-0643 / Micheal Renfro*
	College of Engineering		/ /
	Department of Civil Engineering		/ /
			/ /
10b	(Collaborating and/or Affected Units)		
	Department of Marketing and Supply Chain		/ /
			/ /
			/ /
			/ /
			/ /
			/ /
			/ /

			/ /
			/ /

10c	(Senate Academic Council)	**Date Approved**	**Contact Person Name**
	Health Care Colleges Council (if applicable)		
	Graduate Council		Roshan Nikou

INFORMATION REQUIRED BY CPE AND SACS	
11. Program Overview – Program Quality and Student Success	
11a*	Highlight any distinctive qualities of the proposed program. Are any faculty nationally or internationally recognized for expertise in this field? Does this program build on the expertise of an existing locally, nationally, or internationally recognized program at UK? *(300 word limit)*
	UK's College of Engineering (CoE) has a number nationally and internationally recognized faculty with expertise in the area of manufacturing systems and supply chains. The Mechanical Engineering department has demonstrated expertise in delivering online graduate programs. UK, therefore, is uniquely positioned to successfully offer the proposed online MS in Supply Chain Engineering (SCE). *Online delivery will increase SCE program accessibility to working professionals who are looking for opportunities for continuing education. The only other supply chain engineering MS program available in the United States is a full-time, face-to-face degree and is not accesible to full-time employed professionals.* *The proposed SCE program is developed collaboratively by the engineeing and business schools at UK with courses taught by faculty from both colleges. In addition, the program is designed to develop multi-disciplinary skills in students by collaborating with those students in the newly proposed Supply Chain Management MS degree from UK's business school. There is no other supply chain engineering or management MS program in the United States with a such a structure. This is another unique feature of the proposed SCE program.* *Thus, the proposed online MS in Supply Chain Engineering will be distinguished in its scientific depth and breadth, collaboration between engineering and business schools in its development and delivery, its nationally and internationally recognized faculty, and the proven experience in delivering online graduate programs. It will serve UK, Kentucky and the nation as a unique program catering to the workforce development needs in supply chain engineering.*
11b	Clearly state the student admission, retention, and completion standards designed to encourage high quality. *(300 words)*
	Admissions: Undergraduate GPA of 3.0. Successful applicants will have an ABET accredited BS in Engineering or a closely related area. *Retention: Each student enrolled in the program will have an advising committee consisting of faculty members with expertise and resources related to supply chain engineering. Each student will work on a well-motivated, multi-discplinary team to address a real-world problem through the capstone Industry Project course.* *Completion: Students are to maintain a GPA of 3.0 in all core courses and the elective course. Students are required to provide a written project report and complete an oral project defense before their faculty committee established according to Graduate School policies (as part of the required SCe 740 Industry Project course). Committee members examine the technical competency of students at the oral defense, which acts as the program final exam.*
11c*	Describe how the proposed program will articulate with related programs in the state. Include the extent to which student transfer has been explored and coordinated with other institutions. Note: Convert all draft articulation agreements related to this proposed program to PDF and append to the end of this form. *(300 word limit)*
	Other related graduate programs in the state are: MS in Industrial Engieering, MEng Industrial Engineering, and MS in Engineering Management all at the University of Louisville. Each of these programs have one, or a few, courses similar to those in the proposed supply chain engineering program. None have the indepth supply chain scope or the multi-disciplinary collaborative course development & teaching (between engineering and business colleges) approach planned for the proposed progam. *If students in these existing programs meet the admission criteria for the proposed MS degree, they will be eligible to transfer into the new program. The UK Graduate School regulations for credit transfer (upto nine credit hours of relevant course credits) will be applied.*

11d	Identify the applicant pool and how applicants will be reached. *(300 word limit)*
	Students graduating with BS degrees in engineering and related disciplines are the primary candidates for the program. As this is an online program, it will be very attractive to those with the aforementioned degrees currently engaged in supply chain-related jobs seeking to advance in their careers. *The program will be broadly advertised to students in BS degree programs in engineering and related areas as an option for graduate education. The program will be marketed regionally and nationally to recruit industry professionals interested in pursuing an advanced degree in supply chain engineering through various channels such as web-based approaches (e.g.: Google ads, social media, etc.), professional societies, and alumni databases, etc.* *Applications (on-line applications submitted in accordance with the Graduate School Policies and including resume, relevant university transcripts, statement of purpose, letters of recommendation) will be reviewd by Director of Graduate Studies for the Supply Chain Engineering MS program, who will make the final admission decision.*

12. Mission: Centrality to the Institution's Mission and Consistency with State's Goals	
12a*	*(related to 2b)* Explain how the program objectives support at least two aspects of UK's institutional mission and academic strategic plan? *(150 word limit)*
	The objective of the SCE program is to prepare students to apply scientific and mathematical principles to design, evaluate and improve transformational and logistical functions within an enterprise and among its partners across the supply chain. *The proposed SCE MS program will directly support and implement UK's strategy in (1) Graduate Education and, in (2) Research and Scholarship. This will be achieved by:* *1. Facilitating learning informed by scholarship and research thereby expanding knowledge and skills* *2. Serving the commonwealth and the greater society by developing capabilities and expanding scholarship to address some of the most challenging problems faced by industry in the supply chain domain.*
12b*	*(related to 2b)* How do the program objectives support at least two aspects of the Council on Postsecondary Education's (CPE) Strategic Agenda and the statewide implementation plan? *(300 word limit)*
	One aspect of the CPE's Strategic Agenda that the proposed program will support is to "Increase degree and certificate completion, fill workforce shortages, and guide more graduates to a career path." Another aspect of the CPE agenda that will be impacted by the proposed program is that "Kentucky will be stronger by training a globally competitive, entrepreneurial workforce; educating an engaged, informed citizenry; improving the health and well-being of families; and producing new research and discoveries that fuel job creation and economic growth." *KY is a national logistics hub due to its geographical location. The state is home to some of the large companies who are major players in the supply chain domain (e.g.: UPS, DHL, Amazon, etc.). In addition, KY is also home to some large OEMs (e.g.: Toyota, GE Appliances, Ford, etc.) and a major player in the automotive and aerospace industries. The proposed SCE MS degree will contribute to CPE's strategic objectives by offering advanced education in the supply chain area that will directly impact a number of important industry sectors in the state. The program will prepare industry-ready graduates who can help enhance the performance of supply chain operations and help increase competitiveness of Kentucky companies to promote economic growth. Irrespective of the technologies used by companies, successful supply chain operations are essential to develop products and deliver them to end consumers. The proposed SCE program will prepare graduates who can contribute to achieving this goal. Further, the online modality will increase program accessibility statewide, as well as across the nation, and provide better opportunities to increase degree completion.*
12c*	If an approval letter from an Education Professional Standards Board (EPSB) is required, check the box below and append a PDF version of the letter to this form. ☐

	(E.g. any program leading to teacher, principal, or superintendent certification, rank change, etc.)
13. Resources	
13a*	How will the program support or be supported by other programs within the institution? For example, shared faculty, shared courses, collaborative research, etc. *(300 word limit)*
	The courses in the program will be taught by facutly in three different units: Mechanical Engineering, Civil Engineering, and Gatton College of Business and Economics. In addition to enabling teaching in the multi-disciplinary SCE degree, this program will also increase opportunities for collaborative research in supply chain-related topics among faculty from these three units as well as others within UK. *The program will also add value to the online MS in Manufacturing Systems Engineering, online Graduate Certificate in Manufacturing Systems as well as the newly proposed (by UK's Gatton College of Business and Economics) MS degree in Supply Chain Management. Students in all these programs will have the opportunity to benefit from the new courses in the proposed program that can be taken as electives.*
13b	What will be the projected "faculty-to-student in major" ratio? *(150 word limit)*
	Because the courses from this program will be taught by faculty from three units who already support multiple undergraduate and graduate programs, the faculty-to-student ratio cannot be computed for the proposed program independently of other degree programs supported by the faculty of the three units. We anticipate 25-30 new MS students to be enrolled through this program. If only the graduate programs and faculty in the Mechanical Engineering department (where the program will be housed) are considered, the proposed program will represent an approximately 45% increase from the current total MS in Mechanical Engineering and MS in Manufacturing Systems Engineering MS enrollment.
13c	Describe the library resources available[19] to support this program. Access to the qualitative and quantitative library resources must be appropriate for the proposed program and should meet recognized standards for study at a particular level or in a particular field where such standards are available. Adequacy of electronic access, library facilities, and human resources to service the proposed program in terms of students and faculty will be considered. *(300 word limit)*
	UK library resources are already sufficient to support this program.
13d	Describe the physical facilities and instructional equipment available to support this program. Physical facilities and instructional equipment must be adequate to support a high-quality program. Address the availability of classroom, laboratory, and office space, as well as any equipment needs. *(300 word limit)*
	No additional physical facilities will be required to deliver the courses for this program. Instructional resources are also already available to support this program.
14. Demand and Unnecessary Duplication	
14a*	Provide justification and evidence to support the need and demand for this proposed program. Include any data on student demand, career opportunities at any level, or any recent trends in the discipline that necessitate a new program. *(300 word limit)* • This evidence is typically in the form of surveys of potential students and enrollments in related programs at the institution. • Anecdotal evidence is insufficient. Demonstrate a systematic collection of data, thorough study of the data, and a reasonably estimated student demand for the program. Provide evidence of student demand at state and national levels.
	KY is a national logistics hub due to its central geographic location. The state is home to the world hub of UPS, North American hub of DHL, and the air hub of Amazon. As of 2017 the state also had 482 logistics/distribution operations. The globalization of supply sources and demand has seen a growth in supply chains and their

[19] Please contact Institutional Effectiveness (institutionaleffectiveness@uky.edu) for more information.

	complexity, leading to an increased demand in talent. A Burning Glass (national labor database) analysis revealed that the demand for supply chain jobs will grow by approximately 7% in KY and the surrouding states in the next eight years. Several reports have highlighted the national skills gap for trained professionals in supply chain-related careers. One report estimates that demand for professionals in this area will exceed supply by a ratio of six to one. In addition, the importance of a technically savvy workforce capable of designing, installing, and improving complex supply chains to operate with technologies such Internet of Things (IoT), digitalization,blockchain, etc., has also been well-publicized.		
14b	Clearly state the degree completion requirements for the proposed program. *(150 word limit)*		
	Students in the program must meet the following requirements for degree completion. 1. Complete the three common core courses (SCE 630, SCE 631, and SCE 635) 2. Complete the engineering core courses (SCE 503, SCe 604, SCE 610, SCE 614, and SCE 632) 3. Complete an elective course 4. Complete Industry Project (SCE 740), write report and make final presentation. Students must obtained a grade of C, or higher, for all the courses to complete the degree requirements.		
14c*	Will this program replace or enhance any existing program(s) or tracks (or concentrations or specializations) within an existing program? *(300 word limit)*	Yes ☒	No ☐
	If "Yes," explain: *This program will help enhance the courses available to students in the online Manufacturing Systems Engineering MS program and the online Graduate Certificate in Manufacturing Systems at the University of Kentucky. The courses in the program can also be beneficial to students in other engineering graduate programs who are interested in taking supply chain-related courses as electives.*		
14d	Identify the primary feeders for the program. *(150 word limit)*		
	Students graduating with BS degrees in engineering and related disciplines are the primary candidates for the program. As this is an online program, it will also be very attractive to those with the aforementioned degrees currently engaged in supply chain-related jobs seeking to advance their careers.		
14e	Describe the student recruitment and selection process. *(300 word limit)*		
	The program will be broadly advertised to students in BS degree programs in engineering and related areas as an option for graduate education. The program will be marketed regionally and nationally to recruit industry professionals interested in pursuing an advanced degree in supply chain engineering through various channels such as web-based approaches (e.g.: Google ads, social media, etc.), professional societies, and alumni databases, etc. *Applications (on-line applications submitted in accordance with the Graduate School Policies and including resume, relevant university transcripts, statement of purpose, letters of recommendation) will be reviewd by Director of Graduate Studies for the Supply Chain Engineering MS program, who will make the final admission decision.*		
14f*	Specify any distinctive qualities of the proposed program. *(300 word limit)*		
	The proposed Supply Chain Engineering (SCE) MS program is offered by the College of Engineering (CoE) at UK but will be developed and taught jointly by faculty from both the CoE and Gatton College of Business & Economics (Gatton) at UK. The proposed degree includes a set of core courses that will also be required for the newly proposed (by Gatton) Supply Chain Management MS program. This apporach is adopted to ensure students will understand the complexity of supply chain challenges and appreciate the multi-discplinary capabilities required to solve such problems. Students in the SCE program also are required to take additional, and more technical, courses to improve their analytical capabilities to model, evaluate and improve supply chain decision making. *No other supply chain graduate program (in engineering or business) in the country has this unique structure to promote multi-disciplinary learning and problem solving.*		

14g	Provide any evidence of a projected net increase in total student enrollments to the campus as a result of the proposed program. *(300 word limit)*		
	25-30		
14h	Use table below to estimate student demand for the first five years following implementation.		
	Academic Year	# Degrees Conferred	Majors (headcount) Fall Semester
	2021 - 2022	*0*	*10*
	2022 - 2023	*0*	*10*
	2023 - 2024	*10*	*15*
	2024 - 2025	*10*	*15*
	2025 - 2026	*15*	*15*
14i	Clearly describe all evidence justifying a new program based on changes in the academic discipline or other academic reasons. *(300 word limit)*		
	Several reports have highlighted the national skills gap and demand for trained professionals in supply chain-related careers. One report estimates that demand for professionals in this area will exceed supply by a ratio of six to one. The retiring baby boomers are projected to leave a large number of unfilled jobs in this area. In addition, the importance of a skilled, technically savvy workforce capable of designing, installing, and improving complex supply chains to operate in environments with technologies such Internet of Things (IoT), digitalization, blockchain, etc., has also been well publicized. An assessment of job postings in the states surrounding Kentucky (through Burning Glass) revealed there were more than 6,000 job postings in supply chain-related careers in the last 12 months and with a projected growth in similar postings. Therefore, the establishment of the MS in SCE degree program at UK is both compelling and timely. *While many Industrial Engineering graduate degree programs include courses related to the design, analysis, and improvement of supply chain decision making, none of those programs have a specific emphasis on supply chains alone. The growth in the breadth and complexity of supply chain problems, and the emergence of novel technologies--such as IoT, blockchain, etc.,--has created a need for more specific programs dedicated to the supply chain domain. The launching of the Supply Chain Engineering MS program at the Georgia Institute of Technology, one of the top rated Industrial Engineering programs in the country, underscores the need to develop new program to specifically education and workforce development needs in the supply chain domain.*		
14j	Has the Council on Postsecondary Education identified similar programs?[20]	Yes ☒	No ☐
	If "Yes," the following questions (14jh1 – 14jh5) must be answered.		
(1)	Does the program differ from existing programs in terms of curriculum, focus, objectives, etc.? *(150 word limit)*	Yes ☒	No ☐
	If "Yes," explain: *The University of Louisville (UL) offers MS and MEng in Industrial Engineering degrees. These degrees focus on general industrial engineering principles and practices. The latter has one core course in a supply chain-related topic. The proposed MS degree is entirely focused on teaching the multi-disciplinary knowledge and skills necessary to design, evaluate, and improve transformational and logistical functions in supply chains. Therefore, the scope and objectives of the proposed programs and those at UL are very different. The proposed program also has shared curriculum taught by the College of Business and Economics faculty at the University of Kentucky that are included in their proposed MS in Supply Chain Management degree. This aspect is designed to ensure Engineering students develop skills to work in multi-disciplinary teams with managers. This is also unique to the degree program proposed here and makes it very different to the existing UL programs.*		
(2)	Does the proposed program serve a different student population (e.g., students	Yes ☒	No ☐

[20] Please contact OSPIE (OSPIE@L.uky.edu) for help with this question.

	in a different geographic area or nontraditional students) from existing programs? *(150 word limit)*		
	If "Yes," explain: *The proposed MS degree is a fully online offering that targets working professionals who will be pursuing the degree on a part-time basis. In contrast, the UL degrees are offered face-to-face and primarily targets full-time students.*		
(3)	Is access to existing programs limited? *(150 word limit)*	Yes ☒	No ☐
	If "Yes," explain: *Acces to the UL degrees are limited to students in the Louisville and surrounding area and mostly to those who are able to attend college on a full-time basis. The proposed degree is offered online and will be accesible to any interested student throughout the state of Kentucky. It will also be accesible to working professionals employed across the state and the nation.*		
(4)	Is there excess demand for existing programs? *(150 word limit)*	Yes ☒	No ☐
	If "Yes," explain: *A market analysis was conducted using the Burning Glass portal. Job postings for supply chain-related careers were analyzed to evaluate demand. The analysis revealed an approximately 7% growth in supply chain related careers over the next eight years in KY and surrounding states. Other reports have also indicated that, at the national level, the demand for supply chain professionals will exceed supply by a ratio of six to one. More information is also included in the appendix.*		
(5)	Will there be collaboration between the proposed program and existing programs? *(150 word limit)*	Yes ☐	No ☒
	If "yes," explain the collaborative arrangements with existing programs. If "no," explain why there is no collaboration with existing programs.		
	No collaboration is planned at the onset. This is because the scope of the two programs and the delivery modalities are very different. However, the opportunities for collaboration in the long-term with faculty teaching jointly offered courses will be explored.		
14k*	Are there similar programs in other Southern Regional Education Board (SREB) states in the nation?	Yes ☒	No ☐
	If "Yes," please answer the questions below to demonstrate why this proposed program is needed in addition to the one(s) currently in existence.		
14k. i*	Identify similar programs in other SREB states and in the nation.		
	The Georgia Institute of Technology (GA Tech) has the only other Supply Chain Engineering MS program in the nation.		
14k.ii*	Does the program differ from existing programs in terms of curriculum, focus, objectives, etc.?	Yes ☒	No ☐
	If "Yes," explain. *(300 word limit)*		
	The GA Tech Supply Chain Engineering MS program is offered by the College of Engineering and the curriculum is focused on analytical tools and capabilities necessray for supply chain design. The Supply Chain Engineering MS program proposed by UK is unique due to the collaborative approach between the College of Engineering and the Gatton College of Business & Economics (Gatton) at UK. The proposed program is developed to have a set of core courses (12 hours) common to the proposed Supply Chain Engineering MS program and the Supply Chain Management MS program proposed by Gatton. These common core courses are developed and taught by a team of faculty from both colleges to ensure the students learn the interdisciplinary skills necessary to succeed in supply chain careers.		
14k.iii*	Does the proposed program serve a different student population (e.g., students in a different geographic area and non-traditional students) from existing programs?	Yes ☒	No ☐
	If "Yes," explain. *(300 word limit)*		
	The program will be offered online and available to eligible students across the country. Also, the program		

	is structured to enable students to take two courses per semester, on a part-time basis. This provides the flexibility for full-time employed individuals to enroll in the program.		
14k.iv*	Is access to existing programs limited?	Yes ☒	No ☐
	If "Yes," explain. *(300 word limit)*		
	The program will be available to students with an ABET accredited BS degree in engineering, or a closely related area, with a GPA of 3.0 or higher.		
14k.v*	Is there excess demand for existing similar programs?	Yes ☒	No ☐
	If "Yes," explain. *(300 word limit)*		
	The only similar program available at the Georgia Institute of Technology (GA Tech) has a current enrollment of 70 students. The GA Tech program is a full-time program and is not accessible to those already employed full-time and/or living in other geographical regions. The Burning Glass analysis revealed an approximately 7% growth in supply chain-related careers over the next eight years in KY and surrounding states. Therefore, it is reasonable to assume there is excess demand for similar programs in the region. Other reports have indicated that, at the national level, the demand for supply chain professionals will exceed supply by a ratio of six to one. This is evidence that there is a national demand for similar programs that can be satisfied through the proposed online Supply Chain Engineering MS program.		
14k.vi*	Will there be collaboration between the proposed program and existing programs?	Yes ☐	No ☒
	If "No," explain. *(300 word limit)*		
	The GA Tech program is a full-time, face-to-face program. As such, there will not be much opportunity to collaborate.		
14l	Would your institution like to make this program available through the Academic Common Market[21]?	Yes ☒	No ☐
14m	Clearly describe evidence of employer demand or discipline needs. Such evidence may include employer surveys, current labor market analyses, and future human resources projections. Where appropriate, evidence should demonstrate employers' preferences for graduates of the proposed program over persons having alternative existing credentials and employers' willingness to pay higher salaries to graduates of the proposed program. *(300 word limit)*		
14n*	Describe the types of jobs available for graduates, average wages for these jobs, and the number of anticipated openings for each type of jobs at the regional, state, and national levels.		
	Kentucky is a national logistics hub due to its central geographic location. The state is home to the world hub of UPS, North American hub of DHL, and the air hub of Amazon. As of 2017 the state also had 482 logistics/distribution operations with almost 62,000 full-time jobs. The globalization of supply sources and demand has seen a tremendous growth in supply chains and their complexity leading to an increased the demand in talent in this area. Thus, supply chain skills requirements are expected to grow strongly and steadily within the state as well as across the nation. A Burning Glass (national labor database) analysis revealed that the demand for supply chain jobs will grow by approximately 7% in KY and the surrouding states in the next eight years, higher than that rate of growth projected for the national labor market. *Several reports have highlighted the national skills gap and demand for trained professionals in supply chain-related careers. One report estimates that demand for professionals in this area will exceed supply by a ratio of six to one. The retiring baby boomers are projected to leave a large number of unfilled jobs in this area. In*		

[21] Please contact OSPIE (OSPIE@L.uky.edu) for more information.

	addition, the importance of a skilled, technically savvy workforce capable of designing, installing, and improving complex supply chains to operate in environments with technologies such Internet of Things (IoT), digitalization, blockchain, etc., has also been well publicized. *The only existing Supply Chain Engineering MS program in the nation is at the Georgia Tech (a full-time program and does not cater to the working professionals). The Ohio State University offers a Master of Business Logistics Engineering while MIT offers a Master of Engineering (MEng.) and a Master of Applied Science (MASc) in Supply Chain Management. Therefore, the proposed MS in SCE UK will be uniquely positioning itself to produce graduates who will be able to contribute to the workforce in an area of national need. Further, the online delivery of the SCE program will increase accessibility to interested students across the nation.*
15. Assessment and Oversight	
15a*	Describe *program* evaluation procedures for the proposed program. These procedures may include evaluation of courses and faculty by students, administrators, and departmental personnel as appropriate. Program review procedures shall include standards and guidelines for the assessment of student outcomes implied by the program objectives and consistent with the institutional mission. *(300 word limit)*
	The objective of this program is to prepare students to apply scientific and mathematical principles to design, install and improve all transformational and logistical functions within an enterprise and among its partners across the supply chain. The specific program objectives are that, upon graduation, program graduates will: 1. Obtain employment and advance in careers appropriate to an advanced technical degree in Supply Chain Engineering. 2. Be leaders in the industrial sector or be pursuing further graduate study. 3. Use their science, technical, and professional skills to make a positive impact on society and the world. 4. Engage in continued professional development and life-long learning. These program-level outcomes will be assessed using data gathered from job placement data and alumni surveys to determine, among other information, alumni satisfaction with the professional skills acquired in the program in support of objectives 1-4. The survey will be administered and analyzed by the graduate committee every three years. Together with the alumni survey data, the graduate committee will also review secondary measures of the overall quality of the program: the appropriateness of core courses in their support of objectives 1-4; the relevance of final projects to objectives 1-4; time-to-graduation; as well as enrollment numbers and GPA. Every three years in fall, the DGS will contact program alumni with the request to complete and return the alumni survey. The DGS will also compile statistics on time to degree, retention and enrollment and collect the current syllabi of all core courtses. The following spring the graduate committee for the program will meet to review the collected data, assess the program, its strngths and weaknesses and will propose corrective actions, if appropriate.
15b*	Describe how each program-level student learning outcome will be assessed and how assessment results will be used to improve the program. *(300 word limit)*
	(Also see attached curriculum map and assessment plan.) *At the program-level, SLO 2 of students' ability to work in a multidisciplinary team-based environment will be assessed according to rubrics, designed by the instructors to see if students can appreciate the multidisciplinary team-based environment in supply chain engineering, by recognizing different problem settings in different disciplines, different approaches used to solve a problem, and different objectives to solve the problems from different perspectives, such as to maximize return vs. to minimize risk, and to minimize production cost vs. to minimize holding cost. SLO 3 of students' ability to design and analyze complex global supply chains will be assessed i) indirectly by student grades in a course and ii) directly by rubrics, designed by the instructors to see if students can model complicated problems in global supply chains by applying the advanced mathematical modeling and simulation tools, and if they can adaptively change specifications on solutions through analyses, such as the average, lower and upper limits for expected values and variations.* *Industry project presentations will be used as a second direct assessment, for which committee members will fill out a form of rubrics with elements different from those for courses. Such presentations will be served as part of the final MS examination, assessing both the written document and the oral defense as primary artifacts.*

	The third direct assessment is data of job placement and alumni surveys. *The DGS for the program will aggregate data of these three types of assessment. The program graduate curriculum committee will meet annually to review these data, identify any concerns or weaknesses, and recommend changes to improve the quality of courses and/or the program.*

16. Cost and Funding of the Proposed Program[22]			
16a	Will this program require additional resources?	Yes ☒	No ☐
	If "Yes," please provide a brief summary of additional resources that will be needed to implement this program over the next five years. *(300 word limit)*		
	Existing faculty within different departments have the expertise to teach courses in the program. However, all faculty currently have full teaching loads, delivering courses in existing programs. While they can be engaged in teaching some courses in the short term (as overload), new faculty hiring will be required for the success and growth of the SCE program. The ME department will require one tenure-track faculty and one non tenure-track person (lecturer/ part-time instructor) to deliver the new courses. Part-time instructor will also be recruited to teach in the program. *A letter from the College of Engineering Dean expressing commitment to invest the required resources for faculty hiring is attached.*		
16b	Will this program impact existing programs and/or organizational units within your institution? *(300 word limit)*	Yes ☐	No ☒
	If "Yes, briefly describe.		
16c	Provide adequate documentation to demonstrate sufficient return on investment to the state to offset new costs and justify approval for the proposed program. Note whether the program is predicted to: increase retention rates; increase revenue; attract a new pool of students; meet employment needs in the state; feed into fields that have been shown to be beneficial to the economic needs of the state, etc. *(300 word limit)*		
	The costs of implementing and running the MS in Supply Chain Engineering degree can be met with the new funds that will be generated from the tuition revenue. There are also other non-financial benefits from implementing this program. The program will help address a emerging, and increasingly windening, skills gaps in the supply chain area in the state, the surrounding region, and across the nation. Given there is only one other program in the country offering a MS degree in Supply Chain Engineering, the university and the state can position itself as a center of excellence to develop talent in the supply chain area. *The collaborative approach proposed to develop and teach this program as well as the close links it will help establish with industry (for the Industry Project course) can promote interdisciplinary research and convergent research at the University of Kentucky.*		

17.* Budget Funding Sources, by Year of Program

All the fields in number 16 are required for the CPE's pre-proposal form. Estimate the level of new and existing resources that will be required to implement and sustain the program using the spreadsheet below. Please answer in terms of dollar amounts. All narratives have a 100-word limit.

Total Resources Available from Federal Sources (Federal sources include grants, earmarks, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*0*	*0*	*0*	*0*	*0*
Existing	*0*	*0*	*0*	*0*	*0*
Narrative/Explanation:	*No known federal resources for creation of new program in this area*				

[22] For questions about cost and funding of the program, please contact your department chair, business officer, or associate dean for academic affairs.

Total Resources Available from Other Non-State Sources (Non-state sources include philanthropies, foundations, individual donors, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*0*	*0*	*0*	*0*	*0*
Existing	*0*	*0*	*0*	*0*	*0*
Narrative/Explanation:	*No non-state allocations available*				
`					
State Resources (State sources include general fund revenue, grants, pass-thru funds, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*0*	*0*	*0*	*0*	*0*
Existing	*0*	*0*	*0*	*0*	*0*
Narrative/Explanation:	*No specific state allocations have been made.*				
Internal (The source and process of allocation and reallocation should be detailed, including an analysis of the impact of the reduction on existing programs and/or organization units.)[23]:	1st Year	2nd Year	3rd Year	4th Year	5th Year
(New) Allocated Resources					
(Existing) Reallocated Resources					
Narrative/Explanation:					
Student Tuition (Describe the impact of this program on enrollment, tuition, and fees.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*100000*	*100000*	*200000*	*200000*	*200000*
Existing	*0*	*100000*	*150000*	*250000*	*250000*
Narrative/Explanation:	*The tuition rate will be fixed tuition rate of $25,000 irrespective of whether the students are within or out of state. Students will be enrolled over a period of 5 semesters. For revenue calculations it is assumed that 2/5 of tuition is recovered in the first year of enrollment in the program, another 2/5 in the second year and 1/5 in the 3rd year following enrollment.*				
Total Funding Sources	1st Year	2nd Year	3rd Year	4th Year	5th Year
Total New	*100000*	*100000*	*150000*	*150000*	*150000*
Total Existing	*0*	*100000*	*150000*	*250000*	*325000*
TOTAL FUNDING SOURCES	100000	200000	300000	400000	475000

[23] The source and process of allocation and reallocation should be detailed, including an analysis of the impact of the reduction on existing programs and/or organizational units.

18. Breakdown of Program Expenses/Requirements[4]					
(Please note – all the fields in number 17 are required for the CPE's pre-proposal form.)					
Staff: Executive, Administrative & Managerial (Include salaries and whether new hires will be part time or full time.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*47000*	*47940*	*48899*	*49877*	*50874*
Existing					
Narrative/Explanation[24]:	*A recurring commitment to 0.5 FTE for an administrative assistant, estimated at $24000/year, and to one summer month salary for the Director of Graduate Studies, estimated at $15000. This equals to $39000 plus 28% benefits in year 1; a 2% annual increase is included.*				
Other Professional (Include salaries.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative/Explanation:					
Faculty (Include salaries and whether new hires will be part time or full time.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*167600*	*170672*	*173805*	*177002*	*180262*
Existing					
Narrative/Explanation[25]:	*The ME department will require one new tenure-track faculty and one new non tenure-track person (lecturer/ part-time instructor) to deliver the new courses. Part-time instructor will also be recruited to teach in the program. The new full-time faculty will be recruited in year 1 of the program. For the tenure-track faculty, 50% of the salary is charged to the program budget. Benefits and a 2% annual increase is included. The program includes two courses taught by current faculty. New sections of these courses will be offered for the proposed program and an amount equal to $7K/course is included as overload in each of the years.*				
Graduate Assistants (Include salaries and/or stipends.)[26]	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*14850*	*15147*	*15450*	*15759*	*16074*
Existing					
Narrative Explanation/Justification:	*One Teaching Assistant is included to support with program software development and assist with courses, as appropriate. Salary for TA @ $13.5K plus benefits in year 1 and increasing 2% is included*				
Student Employees (Include salaries and/or stipends.)	1st Year	2nd Year	3rd Year	4th Year	5th Year

[24] Discuss whether new hires will be full-time or part-time.
[25] If new hires are involved, explain whether new hires will be full-time or part-time.
[26] Identify the number of assistantships/stipends to be provided; Include the level of support for each.

New					
Existing					
Narrative Explanation/Justification:					
Equipment and Instructional Materials	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Library (Include new journal subscriptions, collections, and electronic access.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Contractual Services	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Academic and/or Student Services	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Other Support Services	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*80000*	*75000*	*20000*	*20000*	*15000*
Existing					
Narrative Explanation/Justification:	*$50,000 is included in years 1 and 2 to support the development of comprehensive online virtual simulations and software to teach content in the online platform and provide students hands-on experience through virtual/augmented reality environments. In addition, $30K and $25K are included in years 1 and 2 for marketing expenses. An amount equal to $20K is included for years 3-5 for program marketing*				
Faculty Development (Include travel, conference fees,	1st Year	2nd Year	3rd Year	4th Year	5th Year

consultants, etc.)					
New	*30000*	*30000*	*10000*	*10000*	*10000*
Existing					
Narrative Explanation/Justification:	*An amount equal to $10k per course is included to provide support for faculty to delvelop online courses. This is based on the rate offered for facutly to develop online courses in other engineering programs at the University of Kentucky. The budget includes epenses for 3 courses per year for first two years and on-going expenses at $10/k.*				
Assessment (Include personnel, software tools, data collection tools, survey administration, outside consulting services, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Student Space and Equipment	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Other	1st Year	2nd Year	3rd Year	4th Year	5th Year
New					
Existing					
Narrative Explanation/Justification:					
Total Expenses/Requirements	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	*339450*	*345899*	*275437*	*280066*	*279787*
Existing					
TOTAL Program Budgeted Expenses/Requirements:					
GRAND TOTAL	1st Year	2nd Year	3rd Year	4th Year	5th Year
Total Funding Sources	***100000***	***200000***	***300000***	***400000***	***475000***
Total Expenses/Requirements	***339450***	***345899***	***275437***	***280066***	***279787***
TOTAL NET COST:	***-239450***	***-145899***	***24563***	***119934***	***195213***

19. Course Descriptions	
19a	**Program Core Courses (includes pre-major and pre-professional courses)**
Prefix & Number	Course Description (from the Bulletin or the most recent new/change course form)

SCE 630	*Supply Chain Strategy: Supply chain management concerns the integration of key business processes that enable fulfillment of end-customers' real needs. Central to supply chain management philosophy is integration - the socio-technical linkages that facilitate the efficient flows of information, ideas, knowledge, goods, services, and cash through the supply chain. This course will introduce students to the terminology, concepts, and skills related to supply chain management, with a focus on strategic, relational, and operations issues. Through this course, students will develop an understanding of important supply chain terminology, processes, systems, and improvement methodologies that enable effective management and strategy deployment.*
SCE 631	*Production and Operations Management: This course will introduce students to concepts, tools, and techniques necessary for planning and control of production and other operations of an organization. Organizational processes from sourcing and inventory management to production planning and scheduling as well as quality control will be covered. Students will learn how to model and analyze operations, and to evaluate impact of various strategies on the processes and on products/service quality, productivity, efficiency, and cost effectiveness, especially when there are uncertainties.*
SCE 635	*Logistics Management: This course focuses on the physical distribution, movement, and delivery of goods and services throughout the supply chain so that the right amount of materials and/or products arrive at the right place at the right time. It requires the co-ordination, organization, and management of an organization's distribution network to perform such function as facility location, transportation, storage, material handling, packaging, inventory control, order fulfillment, and reverse logistics.*
SCE 740	*Industry Project*
SCE 503	*Lean Manufacturing Principles and Practices: This course will introduce students to the fundamentals concepts of production improvement utilizing lean manufacturing principles and practices. In addition to the lectures, web-based simulations/experiments/games will be used to help learn the application of the tools. An application project is also included where students will work to study a real-life manufacturing or service environment to assess the current state, identify improvement opportunities and develop countermeasures for implementation.*
SCE 604	*Systems Optimization and Simulation: This course is to equip students with rigorous modeling theories and analyzing skills, based on which to push students from Knowledge and Comprehension to Synthesis and Evaluation through simulation. Critical thinking is important to learn this course, in terms of modeling, solution seeking and justification, and perpetual improvement. Students are encouraged to think critically about existing models and available technologies, identify their relative strength and weakness, and develop new knowledge in theory and industrial application.*
SCE 610	*Big Data and Supply Chain Analytics: This course introduced the analytical skills necessary to work with large data sets, focusing on applications in the supply chain and in transportation. For the purpose of this course, Big Data is defined as "anything that doesn't fit in an Excel spreadsheet". This course is positioned at the intersection of coding skills, applied statistics and substantive expertise, teaching the practical skills needed to work with increasingly data sets. Main topics to be covered include: fundamentals of programming and data wrangling in Python, data visualization, applied statistical modeling and interpretation, and ethical issues in data analysis, including matters of intellectual honesty.*
SCE 614	*Sustainable Production Systems and Supply Chains: This course aims to provide students with an understanding of the sustainability opportunities and challenges facing manufacturing systems and supply chains. Students will be introduced to the 6R-based approach to sustainable manufacturing and the importance of product-process-system (manufacturing system, and supply chain) integration for improving sustainability performance. Students will also learn tools and techniques that can be used to model, measure and evaluate manufacturing systems and supply chains to improve economic and environmental performance while meeting the needs of consumers, employees, and other stakeholders will be covered.*
SCE 632	*Strategic Supply Chain Design: This course will provide students an in-depth understanding of tools that can be used to design various supply chain operations (plan, source, make, and deliver) to meet*

	performance objectives. The application of various concepts, mathematical models, and simulation tools to model the operations in complex supply chain networks, assess performance, and identify strategies to improve efficiency, profitability and sustainability of supply chains will be covered.
19b	**Program Guided Electives Courses (for the major)**
Prefix & Number	Course Description (from the Bulletin or the most recent new/change course form)
MGT 611	*Managing Effective Organizations: A critical examination of behavior and performance within organizations and between orgnizations. Special attention is paid to the problem of performance at the individual, group and formal organizatonal level.*
MFS 606	*Global Issues in Manufacturing: The need to increase quality, productivity, efficiency and sustainability in manufacturing operations spanning the product, process and systems (manufacturing systems as well as supply chain) domains is essential for companies to be successful. The increased globalization of markets and manufacturing operations, declining natural resources and negative consequences of some manufacturing practices as well as increased legislation in many regions has led to many new challenges that companies must overcome to be successful in competitive markets. This seminar course will introduce students to a variety of global issues in manufacturing through presentations by leading national and international experts in these domains. The seminars will cover a broad range of manufacturing related topics relevant to many disciplines including manufacturing, mechanical and electrical engineering. The course can also help graduate students identify topical issues that need further investigation and could become potential research topics.*
MFS 605	*Modeling, Simulation and Control for Manufacturing: The purpose of this course is to examine methods and systems from the perspectives of modeling, simulation, and control of manufacturing facilities. The emphasis will be primarily on techniques that can be used to model and evaluate performance of systems. Students are encouraged to think critically about available technologies, identify relative strengths and weaknesses, and analyze the technologies toward developing improved solutions to factory control and information management problems.*
MFS 613	*Sustainability, Ethics and Leadership in Manufacturing Organizations; This course is intended to provide future manufacturing managers and leaders a basic understanding of important theories and practices necessary to successfully manage and lead teams to achieve manufacturing organizational objectives. The course is organized into several modules. The first module will focus on developing an understanding and capability to approach ethical and sustainability concerns confronted by manufacturing organizations. This will include coverage of tools to help identify and address societal and environmental obligations of manufacturing organizations and issues confronting them that span multiple cultures and nations. Because people are one of the most important resources in any organization, the second and third modules will address organizational behavior (OB) and individual effectiveness. OB theories and practices that can be used to increase the capability to observe, understand and manage people's behavior will be covered. The last module considers safety and ergonomics as they relate to manufacturing organizations. Coverage will include tools and techniques that can be used to analyze the manufacturing workplaces and ensure its ergonomic design as well as an overview of the current state of occupational safety and health regulations.*
MFS 526	*Lean Operations Management: This course will cover topics in basic lean system operations as well as the management system to support the attainment of highest customer satisfaction with respect to Safety, Quality, Cost, Productivity, Delivery and Human Resource Development. Working in teams, students apply fundamental lean tools and concepts to develop a lean operations environment capable of driving continuous improvement in a simulated factory. As the operational environment evolves, key management principles and tools are explored using the teachings of Taiichi Ohno and others considered to be the pillars of the Toyota Production System. All students must have a webcam and microphone or headset to*

	participate in on-line team and class meetings.
MFS 509	*Perhaps the most difficult part of a so-called ?lean? transformation is to establish an appropriate culture which is greatly influenced by actions of leadership. The goal of leadership is to foster the creation of a culture which allows team member engagement and drives continuous improvement focused on creating the highest value for the customer. This is accomplished by developing a ?True Lean? operational environment in which the group by themselves uses systematic problem solving to improve the work they do to help meet the organizations? targets and goals without the need for direct management involvement. The challenge is to understand how this can be accomplished. This is a distance learning course designed to provide an introduction to important leadership thinking and activities required to create and sustain a lean culture within an organization as practiced by Toyota. The primary content for this course comes from the internationally recognized University of Kentucky Lean System Program?s public Lean Executive Leadership Institute and Lean Certification courses. In addition to weekly presentations by experienced Toyota executives and others, there will be weekly activities/discussions designed to explore each topic in more depth. Topics will include: understanding the True Lean destination and core thinking, management led problem solving, understanding the path to True Lean, and developing a vision and strategy to achieve it. Other important topics discussed i*

19c	**Program Free Electives Courses**
Prefix & Number	Course Description (from the Bulletin or the most recent new/change course form)

19d	**Courses for a Track.** (If multiple tracks are available, click HERE for a template for additional tracks. Append a PDF to the end of this form with each track's courses and descriptions.	
Prefix & Number	Course Type	Course Description (from the Bulletin or the most recent new/change course form)
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	

	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	
	☐ Track Core ☐ Track Elective	

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November 25, 2019

Professor Fazleena Badurdeen
Department of Mechanical Engineering
University of Kentucky
Lexington, KY 40506

Dear Professor Badurdeen,

I am pleased to give my wholehearted support to the new online Master's degree program in Supply Chain Engineering (SCE) and its companion program in Supply Chain Management (SCM), which is being proposed by the Gatton College of Business and Economics simultaneously and in coordination the with the SCE program.

I understand that SCE is proposed as a two-year, 30 credit-hour, online program targeted at teaching students the multi-disciplinary knowledge and skills necessary to design, evaluate, and improve transformational and logistical functions in supply chains. I also understand that the SCE and SCM programs are designed as two independent degree programs sharing a set of common core courses.

The faculty expertise to teach courses in the SCE program currently exists in Civil and Mechanical Engineering. The College of Engineering is committed to recruiting the additional tenure-track faculty member, lecturer and part-time instructor to address increased teaching load that will accompany the new degree program. In addition, we are also committed to dedicating resources to cover all the expenses necessary to successfully launch the SCE degree program including staff and DGS salaries, funds to support online course development as well as program marketing.

I believe that content and mode of delivery of these programs is well conceived and will address critical educational needs for the workforce of Kentucky and beyond. I am pleased that the College of Engineering and the Gatton College have partnered to bring together faculty expertise to create graduate programming that is distinctive and highly relevance for business and industry.
I look forward to the speedy approval of this program and formation of its first student cohort.

Sincerely,

Rudolph G. Buchheit
Dean, College of Engineering
Professor, Chemical and Materials Engineering

University of Kentucky
Gatton College of Business and Economics
Office of the Dean

April 23, 2019

MEMORANDUM

TO: Haoying Chen, Gatton College of Business and Economics
Fazleena Badurdeen, College of Engineering

FROM: Simon Sheather, Dean

SUBJECT: Letter of Support – Master's in Supply Chain Management/Master's in Supply Chain Engineering

The Master's in Supply Chain Management (MSCM) and Master's in Supply Chain Engineering (MSCE) are examples of what can be accomplished when two colleges—Gatton COBE and the College of Engineering—work cooperatively to achieve an outcome of mutual benefit. I am in full support of both programs and am looking forward to the success of both colleges in providing new opportunities for our students and supply chain expertise to employers in the region and around the world.

Currently, the programs share three courses, two of which will be provided by the Gatton College and one by the College of Engineering. The Gatton College will be adding a new tenure track faculty member in supply chain who will be joining us in fall of 2019, and we are committed to hiring a lecturer for fall of 2020 to provide necessary teaching capacity and support to both programs. These additions, along with faculty experts who are currently in the college, represent all the pieces needed to successfully launch the MSCM program and support the MSCE.

The demand for supply chain professionals is strong within the region and our corporate partners are supportive of this newly designed program. It is our expectation that students who matriculate through the MSCM program will find opportunities within the region and beyond. I am personally very excited to be providing the Commonwealth with a much-needed educational opportunity that is an excellent match to a growth area in the state.

If you or anyone else involved with this process has any questions, please do not hesitate to reach out to me.

cc: Rudolph G, Buchheit, Dean of Engineering
David Hardesty, Department Chair of Marketing and Supply Chain
Nicole Thorne Jenkins, Executive Associate Dean

From:	Pearson, RaeAnne
To:	Badurdeen, F
Cc:	Weber, Annie
Subject:	Master of Science in Supply Chain Engineering, MS, Master of Science (14.3501).
Date:	Tuesday, February 12, 2019 12:18:48 PM

Dear Fazleena Badurdeen ,

Thank you for submitting a Notification of intent for **Master of Science in Supply Chain Engineering, MS, Master of Science (14.3501)**.

My email will serve 2 purposes: 1.) Next steps for SACSCOC, and 2.) Verification and notification that you have contacted OSPIE—a Senate requirement for proposal approval.

1. **Next steps for SACSCOC:** None required
2. **Verification that OSPIE has reviewed the proposal:** Based on the documentation presented the proposed program does not constitute a substantive change as defined by the University or SACSCOC, the university's regional accreditor. Therefore, no additional information is required by the Office of Strategic Planning & Institutional Effectiveness at this time. The proposed program change(s) may move forward in accordance with college and university-level approval processes.

IMPORTANT: *Certificates (undergraduate and graduate) will be added to the CPE Inventory once they have been approved by the University Senate. For degree programs, an NOI will be submitted by the Office of Strategic Planning and Institutional Effectiveness to CPE and you will need to work closely with our office to ensure that your proposal meets all external CPE requirements and deadlines.*

Should you have any questions or concerns about UK's substantive change policy and its procedures, please do not hesitate to contact our office.

Office of Strategic Planning & Institutional Effectiveness
University of Kentucky
Visit the Office of Strategic Planning and Institutional Effectiveness Website

From:	Souleyrette, Reginald
To:	Badurdeen, F
Cc:	Erhardt, Gregory
Subject:	FW: Supply Chain Engineering MS Degree - Support Letter
Date:	Thursday, March 7, 2019 2:20:44 PM
Attachments:	Big Data and SC Anal_DL_610.docx

Dear Professor Badurdeen,

The Department of Civil Engineering is pleased to support your development of the new Supply Chain Engineering MS. As part of that support, we agree to provide the attached course, Big Data & Supply Chain Analytics (SCE/CE 610).

If you have any questions, please let me know. Good luck on the degree proposal.

Sincerely,

Reginald R. "Reg" Souleyrette, PhD, PE, F ASCE
Commonwealth Chair Professor and Chair, Department of Civil Engineering
Program Manager, *Transportation Planning and Data Analytics*, Kentucky Transportation Center
161A Oliver H. Raymond Building; Lexington, Kentucky 40506
University of Kentucky - 859-257-5309 (o) 515-231-7264 (m)

From: Brass, Daniel
To: Badurdeen, F
Subject: RE: Inclusion of Course in New Online MS in Supply Chain Engineering
Date: Monday, March 18, 2019 9:38:33 AM

Yes, the Department of Management approves the inclusion of MGt 611 as an elective course in the online MS degree in Supply Chain Engineering.
Dan

Daniel J. Brass
J. Henning Hilliard Professor of Innovation Management
Chair, Department of Management
Director, LINKS Center for Social Network Analysis
Gatton College of Business and Economics
University of Kentucky
dbrass@uky.edu
http://linkscenter.org

From: Badurdeen, F
Sent: Monday, March 18, 2019 9:27 AM
To: Brass, Daniel <daniel.brass@uky.edu>
Subject: Inclusion of Course in New Online MS in Supply Chain Engineering

Dear Dr. Brass,

I am writing to see if your department would approve the inclusion of MGT 611: Managing Effective Organizations as an elective course in a new online MS degree in Supply Chain Engineering that is being proposed by the Department of Mechanical Engineering.

We are hoping to launch the new degree in Fall 2020 and expect to have about 10 students in the inaugural program. Several elective courses are included and we anticipate about 3-4 students to select MGT 611.

Our department plans to share tuition revenue from the online program, as per university guidelines, with the departments that will be offering courses for students in the program.

Could you please provide a letter of support for us to include in the proposal?

Thanks very much,

Fazleena

Fazleena Badurdeen, Ph.D.
Professor of Mechanical Engineering
Director of Graduate Studies, Manufacturing Systems Engineering
414L CRMS Building

University of Kentucky
Lexington, KY 40506, USA
Phone: (859) 323-3252
Fax: (859) 257-1071

University of Kentucky
Gatton College of Business and Economics
Department of Marketing & Supply Chain

March 20, 2019

Michael Renfro, Chair
Mechanical Engineering
University of Kentucky

Dear Michael:

The Marketing and Supply Chain faculty have approved developing Supply Chain Strategy (MKT 630) and Logistics (MKT 635) for the proposed Supply Chain Engineering (SCE) degree program. The vote to permit this course usage was unanimous in favor. Students in the SCE program may also take other marketing and supply chain electives that will be offered as part of our proposed SCM program. It is our understanding that a portion of the tuition revenue from the SCE students will be shared with Marketing and Supply Chain for their enrollment in these courses, as separately agreed to by the College Deans.

Sincerely,

David M. Hardesty

David M. Hardesty
Carol Martin Gatton Endowed Chair
Chair of the Marketing and Supply Chain Department
University of Kentucky

From: Hardesty, David M.
To: Renfro, Michael; Badurdeen, F
Cc: Hardesty, David M.; Sun, Haoying
Subject: SCE/MKT 740
Date: Wednesday, March 20, 2019 3:54:19 PM

Hello Michael and Fazleena,

The Department of Marketing and Supply Chain will support the delivery of the SCE/MKT 740 course by assigning a faculty member for co-teaching.

David

David Hardesty
Carol Martin Gatton Endowed Chair
Department Chair Marketing and Supply Chain
Director of the Behavioral Research Lab
University of Kentucky
david.hardesty@uky.edu

University of Kentucky
College of Engineering
Office of the Dean

351 Ralph G. Anderson Bldg.
Lexington, KY 40506-0503
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F: 859-257-5727
www.engr.uky.edu

April 2, 2019

To Whom It May Concern:

This letter is to confirm that the faculty of the College of Engineering has reviewed and approved the attached proposal for the new online MS in Supply Chain Engineering. The faculty reviewed the proposal documents via email and there were no concerns raised.

If you have any questions, please contact me.

Sincerely,

Kimberly Anderson, Ph.D.
Associate Dean for Administration and Academic Affairs

Badurdeen, F F.

From: Renfro, Michael W. <michael.renfro@uky.edu>
Sent: Tuesday, November 5, 2019 11:12 AM
To: Fazleena Badurdeen
Subject: ME support for SCE program

Fazleena,

An email vote by the ME faculty was held in March after discussion at a faculty meeting to approve creation of the Masters Degree Program in Supply Chain Engineering and to create the following courses and crosslistings: SCE 604, SCE/CE 610, SCE 614, SCE/MKT 630, SCE 632, SCE/SCM 635, SCE/MKT 740. The faculty voted in favor of this proposal on March 15, 2019.

Mike

Michael W. Renfro
Professor and Chair of the Mechanical Engineering Department
University of Kentucky
153 Ralph G. Anderson Building
Lexington, KY 40506

phone: 859-218-0643
fax: 859-257-3304
email: michael.renfro@uky.edu