KENT STATE UNIVERSITY
CERTIFICATION OF CURRICULUM PROPOSAL

Preparation Date **1-May-18**   Curriculum Bulletin _____

Effective Date   **Fall 2019**   Approved by EPC _____

Department   **Mathematical Sciences**

College   **AS - Arts and Sciences**

Degree   **BS - Bachelor of Science**

Program Name   **Actuarial Mathematics**   Program Banner Code **AMAT (This has been the Banner code for the concentration. I assuming that the same code will be used for the program)**

Concentration(s)   Concentration(s) Banner Code(s)

Proposal   ~~select one~~ Establish program

Description of proposal:

We are proposing the establishment a Bachelor of Science degree in Actuarial Mathematics. Currently, there is an actuarial mathematics concentration. The current program is existing at the bachelor's degree level, albeit as a concentration within the Mathematics major. The curriculum requirements are essentially the same as the requirements for the current concentration with one change. We are requiring COMM 15000 which will count as a Kent Core Additional course, so it does not change the number of hours currently required by the concentration.

Does proposed revision change program's total credit hours?   ☐ Yes   ☐ No

Current total credit hours: Proposed total credit hours **120**
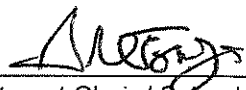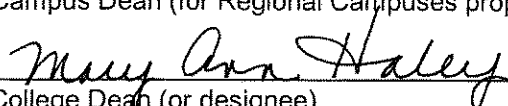
Describe impact on other programs, policies or procedures (e.g., duplication issues; enrollment and staffing considerations; need; audience; prerequisites; teacher education licensure):

Since this program currently exists as a concentration, we are not expecting any impact on other programs, policies, procedures, etc. from this change.

Units consulted (other departments, programs or campuses affected by this proposal):
Economics, Finance

REQUIRED ENDORSEMENTS

_____   5 / 1 / 8
Department Chair / School Director

_____   ___/___/___
Campus Dean (for Regional Campuses proposals)

_____   5 / 11 / 18
College Dean (or designee)

_____   ___/___/___
Dean of Graduate Studies (for graduate proposals)

_____   ___/___/___
Senior Vice President for Academic Affairs and Provost (or designee)

MATH 2

TRANSMITTAL MEMO:

To: Dean Mary Ann Haley, Arts & Sciences

From: Mark L. Lewis, Mathematical Sciences

The Department of Mathematical Sciences is asking for consideration regarding establishing a Bachelor of Science in Actuarial Mathematics. This will replace the current Actuarial Mathematics concentration in the Mathematics Bachelor of Science. The curriculum is essentially the same as the curriculum in the current concentration with one exception. We are adding the requirement of COMM 15000. This will count as on the Kent Core Additional Courses, so it will not change the number of credits required to complete the program.

MATH

HIGHER LEARNING COMMISSION

FORM

New Programs

Substantive Change Application

Institution: **Kent State University**   City, State: **Kent, Ohio**

Name of person completing this application: **Therese E. Tillett**

Title: **Executive Director, Curriculum Services**   Phone: **330-672-8558**   Email: **ttillet1@kent.edu**

Date Submitted: *to come*

The questions are designed to elicit brief, succinct, detailed information, rather than a narrative or references to extensive supporting documents. Do not attach other documents unless they are specifically requested in the questions and are germane to the request. The total submission should be no more than 10–12 pages on a single classification of change. (The page limit excludes attachments. However, the overall length, including attachments, should not exceed 200 pages.)

If the person completing this application is not the CEO, CAO or the ALO of the institution, it is understood that the person completing and submitting this application has consulted with and informed those individuals.

Please note: HLC plans to update the change forms annually, on or about September 1 of each year. However, if a change application form was accessed more than 90 days prior to filing, it is recommended that the institution visit http://www.hlcommission.org/change to ensure that there have been no changes to the application form in the intervening time.

Submit the completed application as a single PDF file on the following webpage: http://www.hlcommission.org/document_upload/.

Part 1: General Questions

1. **Requested Change(s).** Concisely describe the change for which the institution is seeking approval.

   Kent State University proposes establishing a Bachelor of Science degree in Actuarial Mathematics. The program is existing at the bachelor's degree level, albeit as a concentration within the Mathematics major. The program will continue to be offered by the Department of Mathematical Sciences in the College of Arts and Sciences on the Kent Campus.

The program is designed to prepare graduates for the actuary profession and to pass industry-standard certification exams. Actuaries deal primarily with risk. They analyze statistical data—such as mortality, accident, sickness, disability and retirement rates—and construct probability tables to forecast risk and advise industry on how to reduce any likely financial impact of adverse events.

2. **Is this application being submitted in conjunction with another application?**

☐ Yes   ☒ No

3. **Classification of Change Request.**
   Note: not every institutional change requires prior review and approval. Review the "Overview of HLC Policies and Procedures for Institutional Changes Requiring HLC Notification or Approval" to make certain that current HLC policy requires the institution to seek approval.

New academic program(s):

☐ Certificate   ☒ Bachelor's   ☐ Diploma   ☐ Master's/specialist

☐ Associate's   ☐ Doctorate   ☐ *Check if program is at a new degree level*

An institution submitting more than one change request should complete multiple applications, one for each type of change. The types of change requests include:
- Change in mission
- Change in student body
- Competency-based education (credit-based; direct assessment; hybrid) programs
- Consortial arrangement
- Contractual arrangement
- Substantially changing the clock or credit hours required for a program
- Change in academic calendar (e.g., quarters to semester) or change in credit allocation
- Teach-out plan if closing location provides total degree programs
- Distance or correspondence education
- New programs
- Certificate programs
- Branch campuses and additional locations

4. **Special conditions.** Indicate whether any of the conditions identified below fit the institution (Yes or No). If Yes, explain the situation in the space provided.

a) Is the institution, in its relations with other regional, specialized, or national accrediting agencies, currently under or recommended for a negative status or action (e.g., withdrawal, probation, sanction, warning, show-cause, etc.)?

No.

b) Is the institution now undergoing or facing substantial monitoring, special review, or financial restrictions from the U.S. Deptartment of Education or other federal or state government agencies?

No.

c) Has the institution's senior leadership or board membership experienced substantial resignations or removals in the past year?

No.

d) Is the institution experiencing financial difficulty through such conditions as a currently declared state of exigency, a deficit of 10% or more, a default or failure to make payroll during the past year, or consecutive deficits in the two most recent years?

No.

e) Is the institution experiencing other pressures that might affect its ability to carry out the proposal (e.g., a collective bargaining dispute or a significant lawsuit)?

No.

5. **Approvals.** Mark whether each type of approval is required prior to implementing the proposed change. If "Yes," attach documentation of the approval to the request. If "No," attach evidence that approval is not needed.

Internal (faculty, board) approvals   ☒ Yes   ☐ No

System approvals   ☐ Yes   ☐ No   ☒ Not Applicable

State approval   ☒ Yes   ☐ No

Foreign country(ies) approvals   ☐ Yes   ☐ No   ☒ Not Applicable

For Distance or Correspondence Education only: Process in place to ascertain and secure state approval(s) as required   ☐ Yes   ☐ No

6. **Specialized Accreditation.** Complete this section only if specialized accreditation is required for licensure or practice in program(s) covered by this change application.

This section is not applicable as accreditation of the program is not required for graduates to practice as actuaries. Professional certification is done at the individual level. Professional actuaries have to pass exams administered by either the Society of Actuaries or the Casualty Actuarial Society, starting while they are students but continuing after employment. As a concentration, Kent State's program has been included on the Society of Actuaries' list of "Universities and Colleges with Actuarial Programs-–Advanced Curriculum." To receive this designation, a program must maintain course coverage for at least four Society of Actuaries preliminary exams and approved courses for all Validation by Educational Experience topic areas. Kent State plans to continue this designation with the proposed major.

At some point in the future, Kent State may apply for designation as a Center of Actuarial Excellence. This is the highest level of recognition the Society of Actuaries offers universities. To receive this designation, universities must maintain eight specific requirements related to degree, curriculum, graduate count, faculty composition, graduate quality, appropriate academic integration, connection to industry and research/scholarship

☐ The institution has already obtained the appropriate specialized accreditation. Attach a copy of the letter from the agency granting accreditation.

☐ The institution has begun the process of seeking or plans to seek specialized accreditation. Specify the name of the agency and the timeline for completing the process in the space below.

(If approval is a multi-stage process, the institution should contact the HLC staff liaison to discuss the timeline before submitting this change application form.)

☐ The institution does not plan to seek specialized accreditation. Provide a rationale for not seeking this accreditation in the space below.

7. **Changes Requiring Visits.** This section is not for HLC-mandated visits such as additional location confirmation visits or campus evaluation visits.

Note: Complete this section only if the institution is already aware that the proposed change will need to be reviewed through a visit. The institution may submit Part 1 of the change request application to begin the process of scheduling a Change Visit or adding the proposed change to an already scheduled visit. The full application must be submitted at a later date. (If the institution is unsure whether a visit is required, leave this section blank and submit the full change application. HLC will advise the institution based on the information provided.)

This section is not applicable for this proposal.

a) Select the type of visit the institution is requesting:

☐ Request to schedule a Change Visit.

Change Visits typically are scheduled approximately four months from the date an institution submits its change request. The full change application and other required materials will be due to HLC and the peer review team eight weeks before the visit date. See http://www.hlcommission.org/change-visit for more information.

☐ Request to add a proposed change to an already scheduled visit. **Note:** Such requests must be submitted at least six months before the visit date. The institution's full change application should be submitted along with other materials required for the visit.

Specify type of visit and date scheduled:

b) Provide URLs to the institution's Faculty/Staff Handbook and Catalog below. If the URLs are not available, please provide PDF versions of these documents when submitting other required materials prior to the visit.

Faculty/Staff Handbook URL: Catalog URL:

Part 2: Topic-Specific Questions

An institution should submit a separate application for each requested program (unless the programs represent closely related disciplines). If more than one program is being requested in this application, please be sure to sufficiently address each program when answering the following questions, particularly in Sections A, D, E and F. Each proposed new program should be identified by using the *Classification of Instructional Programs* terminology (CIP codes). CIP codes are established by the U.S. Department of Education's National Center for Education Statistics as a taxonomic scheme that supports the accurate tracking and reporting of fields of study and program completions activity. More information is available at http://nces.ed.gov/ipeds/cipcode/.

Attach the "Substantive Change Application, Part 1: General Questions" as page one of your application. That completed form and your answers to the questions below will constitute your request for approval of a substantive change. This form will be the basis for review of this application.

Section A. Characteristics of the Change Requested

1. Identify the basic characteristics of the proposed educational program as indicated below:

    a) The full name of the proposed program, the specific degree (if applicable) or the instructional level (if not a degree program), and the six-digit CIP code XX.XXXX of the program (CIP codes, program name, and additional description [optional])

    The name of the program will be the Actuarial Mathematics major within the Bachelor of Science degree. The CIP most aligned with the program's outcomes is the following:

    27.0305 Financial Mathematics. A program that focuses on the application of mathematics and statistics to the finance industry, including the development, critique and use of various financial models. Includes instruction in probability theory, statistical analysis, numerical methods, computation and simulation methods, stochastic processes, economics and financial markets and applications.

    b) Total credit hours (indicate whether semester or quarter) for completion of the program

    The Actuarial Mathematics major is 120 semester credit hours, comprising 74 credit hours of major requirements and 46 credit hours of general education and additional requirements.

    c) Normal or typical length of time for students to complete the program

    Full-time new students will be able to complete the program in four years (eight semesters).

    d) Proposed initial date for implementation of the program

    Proposed implementation is the fall 2019 semester.

    e) Primary target audience for the program (e.g., full-time, part-time, traditional college age, working adults, transfer students, military personnel, or particular ethnic group)

    The primary targeted audience for the Actuarial Mathematics major will be full-time, traditional college-age students.

    f) Projected life of the program (single cohort or ongoing)

    The program will have ongoing admission.

    g) Whether the program will be part of contractual or consortial arrangement

    Not applicable.

2. Identify if the institution is requesting new stipulations for the proposed program and provide a rationale for this request.

Not applicable.

3. If the institution is planning any involvement by external organizations (other than accredited higher education institutions) in key operations as identified below, provide the information requested below and complete the Contractual Screening Form for each planned involvement. (Note that such involvement by a parent company or by one of its subsidiaries external to the institution in any of these operations should be reported.) If the screening form indicates contractual approval is required, complete the full contractual application and submit it in conjunction with the program application. If the screening form indicates no further action is required, attach the confirmation email from HLC.

This section is not applicable to this proposal.

Type of Involvement	Name(s) of External Organization(s)	Percent of Involvement
A. Recruitment and admission of students		
B. Course placement and advising of students		
C. Design and oversight of curriculum		
D. Direct instruction and oversight		
E. Other support for delivery of instruction		

Section B. Institution's History With Programs

4. Does the institution currently offer a program at the same instructional level and with the same 4-digit CIP code (XX.XX) as the proposed program? If so, identify the program currently offered and whether it is a degree program. Will the proposed program replace the program currently offered?

Presently, Kent State offers one bachelor's degree program in the same four-digit CIP series (27.03 Applied Mathematics). The program is the BS degree in Applied Mathematics (CIP 27.0301 Applied Mathematics, General). The proposed major will not replace the existing major.

5. Does the institution currently offer two or more programs at the same instructional level with the same 2-digit CIP code (XX.) as the proposed program? If so, identify the two such programs with the highest numbers of graduates during the past year, along with their numbers of graduates.

At the baccalaureate level, Kent State offers three degree programs with the same two-digit CIP code (27 Mathematics and Statistics).

The two programs with the highest number of graduates for the fiscal year 2018 are the following:

- Applied Mathematics (BS degree): 11 graduates
- Mathematics (BS degree): 29 graduates *

    * 18 of the 29 graduates were in the Actuarial Mathematics concentration.

Section C. Institutional Planning for Program Change

6. What impact might the proposed program have on challenges identified as part of or subsequent to the last HLC review and how has the institution addressed the challenges?

There are no identified challenges.

7. Briefly describe the planning process for determining the need for this new program, including the role of faculty in the planning and approval process.

The Actuarial Mathematics concentration in the Mathematics major (Bachelor of Science degree) was established in 2009. The program was proposed, planned and operated by faculty in the Department of Mathematical Sciences. As the program has matured and its curriculum has diverged from the Mathematics major core, the faculty has determined that it was time for Actuarial Mathematics to be established as a separate Bachelor of Science degree program.

In addition to being approved by the mathematical sciences faculty and department chair, the major was approved by the College of Arts and Sciences Curriculum Committee; *[future approvals]* the Educational Policies Council, a subcommittee of the Faculty Senate; and the Faculty Senate. The Kent State University Board of Trustees approved the program on *[date]*, see Appendix A.

8. What are the physical facilities and equipment needed to support the program? Indicate the impact that the proposed change will have on the physical resources and laboratories that currently accommodate existing programs and services, or identify new laboratory and preceptor needs.

As the program is existing, current facilities are adequate to support its elevation from a concentration within a major to a separate degree program. There is no anticipation that additional facilities will be required, even if and when enrollment continues to grow.

9. What is the evidence that a market for the new program(s) exists? How has estimated program demand been factored into realistic enrollment projections? How has this evidence been used in planning and budgeting processes to develop a quality program that can be sustained?

Actuarial mathematics is not a new program for Kent State. Within its first four years as an optional concentration in the Mathematics major, enrollment grew from five students to 50. In the past five years, enrollment has averaged 78 students each semester. Nearly 90 students, total, have graduated.

The Actuarial Mathematics concentration now serves a sufficient number of students for it to be viable as a stand-alone major. Moreover, the creation of a separate degree will increase the visibility of the actuarial mathematics program and promote further enrollment growth, although the expectation is enrollment will continue near or just above its current level as the actuarial profession is specialized.

However, there is evidence that employment opportunities within the actuarial and related professions are growing and are expected to continue to grow. The Bureau of Labor Statistics estimates the job outlook for actuaries across the country to grow 22 percent (much faster than average) between 2016 and 2026.[1] Ohio is ranked fifth in the country with the highest employment levels in this occupation.[2] The Ohio Department of Jobs and Family Services lists actuaries as an in-demand occupation, with a starting wage of $59,460 with a bachelor's degree.[3] The insurance, banking, energy and medical industries in Northeast Ohio provide an important job market for graduates of the program.

[1] Bureau of Labor Statistics, U.S. Department of Labor. Occupational Outlook Handbook. Actuaries. Retrieved from www.bls.gov/ooh/math/actuaries.htm.
[2] Bureau of Labor Statistics, U.S. Department of Labor. Occupational Employment and Wages, May 2016. Actuaries. Retrieved from www.bls.gov/oes/current/oes152011.htm.
[3] Ohio Department of Job and Family Services, Office of Workforce Development. In-Demand Occupations. Retrieved from http://omj.ohio.gov/OMJResources/All_InDemand_Short.stm.

10. If the program request is approved, what future growth do you anticipate (e.g., in the next six months, three years) and how do you plan to manage this growth?

Using past enrollment growth in the concentration as a basis, future enrollment is projected at the same rate. The department's goal is between 90-100 students in year three of the major's implementation. While current faculty and staff resources are sufficient to support the program, the proposed major is part of a larger plan to diversify academic opportunities for students and grow enrollment in the Department of Mathematical Sciences. Eventually, new faculty and staff will be needed to sustain these developments and program quality. Those factors will be evaluated annually.

11. How does this program fit into the current and expected financial picture of the institution? In particular, will the program be financially self-sufficient within three years? If not, when do you expect the program to be financially self-sufficient and how do you expect the program to operate until then?

Kent State University operates under a Responsibility Center Management (RCM) financial model, where business-type strategies are used to manage and evaluate new and existing programs. Under this model, costs and revenues are taken into consideration when making decisions about the viability of programs. The proposed Actuarial Mathematics major will be no exception, and will undergo the same scrutiny as other.

The proposed degree program is built around existing courses that are required in the current concentration and other mathematics-strong programs. Therefore, the program can rely on existing faculty, facilities, library resources, equipment and technology (with regular and minor upgrades).

Since the program is existing with current faculty and facilities, fiscal projections show no overall change in revenue or expenses from the current baseline. Therefore, at worst, the net fiscal impact of the proposed major is neutral; and, at best, the presence of a separate major will draw additional students to Kent State. See Appendix B for a fiscal impact statement.

12. What controls are in place to ensure that the information presented to all constituencies in advertising, brochures, and other communications will be accurate?

The Office of the Provost ensures that only faculty- and university-approved program information is included in the University Catalog, degree audit, Explore Programs and Degrees website and student information system (for program admission and graduation). In addition, Kent State's Division of University Communications and Marketing coordinates branding and consistency of all of the university's promotional materials, including the Kent State University website.

Section D. Curriculum and Instructional Design

13. Please list all the courses that comprise the program and identify if the program will include any new courses. Include course descriptions and number of credit hours for each.

See Appendix C for courses comprising the program. All courses are existing and currently offered for this program and others.

14. What are the requirements students must fulfill to complete the program successfully (including specific courses, course options, and any other requirements)?

See Appendix D for the program's catalog copy, including admission, course and graduation requirements. The curriculum for the proposed major is identical to the currently offered concentration with the exception of now requiring an existing course in communication studies.

15. For programs using prior learning credit, compressed time frames, online delivery, accelerated formats, or other approaches to learning, explain how the institution will ensure that student work and the levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Not applicable.

Section E. Institutional Staffing, Faculty, and Student Support

16. How many and what types of faculty (full-time or part-time) will be employed in the program? Why is the number and type of faculty sufficient to support the program? How many, if any, new faculty will be hired for the program?

Initially, the courses for this degree can be taught by existing faculty. The Department of Mathematical Sciences currently employs 43.5 full-time faculty on the Kent Campus (25.5 tenured/tenure-track and 18 non-tenure track). There are two full-time faculty (one tenured and one non-tenure track) who teach the four actuarial courses for the program (MATH 30055, MATH 40055, MATH 40056, MATH 40059). New faculty may be needed to support any growth in the program.

The other courses in the curriculum are required for other programs at the university and are supported by faculty from their respective departments.

17. What will the impact of the new initiative be on faculty workload?

No overall impact on faculty workload is expected.

18. Provide a brief attachment that inventories each faculty member employed to teach in the program, including names of existing personnel, a description of each faculty member's academic qualifications, their prior instructional responsibility and other experiences relevant to the courses they will teach in the program in question, each faculty member's course load in the new program, and the course work each teaches in other programs currently offered. (Note: Do not attach full CVs for each faculty member; rather, the requested information should be summarized in one paragraph for each faculty member.)

See Appendix E for faculty information.

19. For graduate programs, document scholarship and research capability of each faculty member; for doctoral programs, document faculty experience in directing student research.

Not applicable.

20. What library and information resources—general as well as specific to the program(s)—and staffing and services are in place to support the initiative? If the proposed new program is at the graduate level, document discipline-specific refereed journals and primary source materials.

As the program is on-going (as a concentration), existing resources are sufficient. The Kent State University Libraries provide on-ground and online access to thousands of journals, books and databases to students across all eight campuses (through KentLink). Kent State is a member of OhioLink, which gives students access to library materials and electronic research databases from 120 academic libraries in Ohio. In addition, Kent State also maintains a license with Safari Books, a digital library of more than 40,000 books, videos and interactive tutorials.

A mathematics subject librarian works with the Department of Mathematical Sciences to create awareness of library resources and programs and to build library collections appropriate for the department's programs and curriculum.

In addition, University Libraries provide instructional services, including workshops and in-class visits, to educate students on finding and using information effectively and ethically.

Section F. Evaluation

21. Describe the process for monitoring, evaluating and improving the overall effectiveness and quality of the program, and articulate program-level learning outcomes and objectives.

The College of Arts and Sciences monitors a wide range of metrics for all programs on an annual basis. These include enrollment, freshman retention rates, upperclassman persistence rates and four- and six-year graduation rates. Any anomalies are investigated. Grade distributions, student surveys of instruction and student feedback to advisors are also monitored on a regular basis so problems can be addressed without delay. The proposed program will undergo a full evaluation periodically in accordance with university policies on the review of academic programs.

Primary program faculty will meet at least once a semester to review the progress of the degree program and discuss any issues and potential improvements. Faculty will attend professional meetings sponsored by the national actuarial societies to monitor changes in professional credentialing. Program faculty will meet with regional employers of actuaries to discuss how well the curriculum prepares students for the job market. Faculty will solicit feedback from graduates of the program.

The objective of the program is to produce graduates who are prepared to enter the workforce in actuarial and related fields or to begin graduate studies in actuarial science, financial engineering or mathematics.

Graduates of the program will be able to

1. Reason mathematically by using precise definitions, articulating assumptions and reasoning logically to conclusions.

2. Engage effectively in problem solving by exploring examples, assessing the correctness of solutions and interpreting solutions in an actuarial context.

3. Define, interpret and apply standard actuarial notation, terminology and formulas.

4. Analyze various streams of cash flows, both certain and contingent.

5. Apply methods from probability, statistics and stochastic processes to the solution of problems in actuarial science, finance and economics.

6. Communicate solutions of mathematical problems clearly, both orally and in writing.

7. Employ commonly used computer programming languages and software packages to solve problems in actuarial science, finance and economics.

8. Demonstrate fundamental knowledge of finance, economics and accounting.

22. Describe the process for assessing and improving student learning, including student persistence and completion, in the new program.

Kent State University offers many support services to students through a variety of offices, including advising, tutoring, career, counseling, accessibility and technical support. Students are required to meet each semester with a professional academic advisor to review progress using the university's degree audit (Graduate Planning System). In addition, students meet with faculty advisors to discuss research and career goals. Faculty issue evaluation grades for first- and second-year courses between weeks four to seven in the semester to provide feedback to students and allow them time to make adjustments in their studies.

**ADDENDUM TO HIGHER LEARNING COMMISSION
SUBSTANTIVE CHANGE APPLICATION
TO ESTABLISH A NEW UNDERGRADUATE DEGREE PROGRAM**

Proposed Major: Actuarial Mathematics

Proposed Degree: Bachelor of Science

Administrating College: College of Arts and Science

Administrating Department: Department of Mathematical Sciences

Provide the title of the lead administrator for the proposed program and a brief description of the individual's duties and responsibilities.

Title: Coordinator for Actuarial Mathematics

Description: There will be a coordinator for the Actuarial Mathematics program. (Expected to initially be Darci Kracht.) This coordinator will report to the Chair of the Department of Mathematical Sciences (currently Andrew Tonge).

The duties and responsibilities are:

1. Stay current with the expectations and trends in Actuarial Mathematics and work with the Undergraduate Coordinator to insure that our curriculum is current with industry expectations including adequate alignment with the material covered on the professional exams.
2. Advise current students.
3. Keep contacts with people in industry to be able to connect students with potential internships and employment.
4. Recruit potential students.
5. Teach courses in the Actuarial math program as assigned.

Indicate whether any institutions of higher education offer the proposed program within a 30-mile radius of the campus(es) at which the proposed program will be offered. If so, list the institutions that offer the proposed program and provide a rationale for offering an additional program at this campus.

The University of Akron offers a Bachelor of Science in Statistics with Actuarial Science Option. Their program emphasizes statistics, while Kent State University's Actuarial Mathematics program emphasizes mathematics. The Society of Actuaries has designated the University of Akron's program as UCAP-Introductory Curriculum, while Kent State University's current program is designated UCAP-Advanced Curriculum. The current Actuarial Mathematics Concentration at KSU has seen increasing enrollment, despite the presence of another actuarial science program within a 30-mile radius.

B.S. Actuarial Mathematics
Student Learning Outcomes – Major Course Mapping

Major Course ID and Title	Student Learning Outcome 1: Possess mathematical content knowledge and critical thinking skills needed for actuarial science.			Student Learning Outcome 2: Master problem-solving skills and tools needed for problems in actuarial science.			Student Learning Outcome 3: Possess fundamental business knowledge.		
	Introduced	Reinforced	Mastered	Introduced	Reinforced	Mastered	Introduced	Reinforced	Mastered
MATH 12002 Analytic Geometry and Calculus I	✓								
MATH 12003 Analytic Geometry and Calculus II		✓							
MATH 20011 Decision Making Under Uncertainty	✓			✓					
MATH 21001 Linear Algebra	✓								
MATH 22005 Analytic Geometry and Calculus III		✓							
MATH 30055 Mathematical Theory of Interest	✓	✓	✓	✓	✓	✓	✓		
MATH 31011 Proofs in Discrete Mathematics	✓								
MATH 32044 Ordinary Differential Equations		✓							
MATH 40011 Probability Theory and Applications		✓	✓		✓	✓			
MATH 40012 Theory of Statistics		✓	✓		✓	✓			
MATH 40055 Actuarial Mathematics I		✓			✓				
MATH 40056 Actuarial Mathematics II		✓	✓		✓	✓			
MATH 40059 Stochastics Actuarial Models		✓	✓		✓	✓			
CS 10061 Programming for Problem Solving in the Sciences OR CS 13001 Computer Science I OR (CS 13011 AND 13012 Computer Science IA and IB)				✓					
Math Electives		✓			✓				
Allied Area Electives		✓			✓			✓	
ECON 22060 Principles of Microeconomics							✓		

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Course						
ECON 22061 Principles of Macroeconomics				✓		
ECON 32050 Applied Econometrics I	✓	✓		✓	✓	✓
ACCT 23020 Introduction to Financial Accounting			✓			
FIN 36053 Business Finance				✓	✓	✓

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Summary of Program Assessment Plan

1. PROGRAM MISSION

The Actuarial Mathematics major prepares students for a rewarding career as an actuary. The program is highly interdisciplinary, integrating substantial coursework in business, computing, and communications with a solid core of mathematics and statistics. The program will prepare students for several examinations needed for professional credentialing. Graduates of the program will be prepared to enter the workforce immediately or to pursue a graduate degree in fields such as actuarial science and financial engineering.

2. STUDENT LEARNING OUTCOMES:

Student Learning Outcome 1: **Possess mathematical content knowledge and critical thinking skills needed for actuarial science.**

Method of Assessment: All required mathematics courses develop critical thinking skills, particularly the ability to reason mathematically. Content knowledge in the required mathematics courses is highly cumulative, culminating in required courses MATH 30055 Mathematical Theory of Interest, MATH 40011 Probability Theory and Applications, MATH 40012 Theory of Statistics, MATH 40055-6 Actuarial Mathematics I-II, and MATH 40059 Stochastic Actuarial Models. These courses provide students with the specific content knowledge and reasoning skills needed for several of the examinations required for professional certification as an actuary. Depending on the course, students' understanding is assessed by some combination of written assignments, written examinations, and oral presentations. Program-level assessments include evaluation of student preparation for subsequent courses and student performance on professional actuarial examinations.

Achievement Target:
A minimum of 75% of students must earn a C or better in MATH 40055, 40056, and 40059 for the objective to be met.

Student Learning Outcome 2: **Master problem-solving skills and tools needed for problems in actuarial science.**

Method of Assessment: Problem-solving skills are assessed in required courses MATH 30055 Mathematical Theory of Interest, MATH 40011 Probability Theory and Applications, MATH 40012 Theory of Statistics, MATH 40055-6 Actuarial Mathematics I-II, and MATH 40059 Stochastic Actuarial Models. These courses provide students with the problem-solving techniques needed for several of the examinations required for professional certification as an actuary. Additionally, required course ECON 32050 Applied Econometrics I assesses student's ability to solve problems in economics using statistical methods and computer programming languages. Depending on the course, students' understanding is assessed by some combination of written assignments, written examinations, and oral presentations. Program-level assessments include evaluation of student preparation for subsequent courses and student performance on professional actuarial examinations.

Achievement Target:
A minimum of 75% of students must earn a C or better in MATH 40055, 40056, and 40059 for the objective to be met.

Student Learning Outcome 3: **Possess fundamental business knowledge.**

Method of Assessment: This outcome is assessed in required courses ECON 32050 Applied Econometrics I and FIN 36053 Business Finance. Depending on the course, students' understanding is assessed by some combination of written assignments, written examinations, computer projects, and oral presentations.

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Achievement Target: A minimum of 75% of students must earn a C or better in FIN 36053 for the objective to be met.

3. ASSESSMENT RESULTS:
Describe how assessment results will be used for future program improvement (how and by whom results are reviewed and analyzed and how resulting plan of action will be implemented).

The College of Arts and Sciences monitors a wide range of metrics for all programs on an annual basis. These include enrollment, freshman retention rates, upperclassman persistence rates, and four- and six-year graduation rates. Any anomalies are investigated. Grade distributions, student surveys of instruction, and student feedback to advisors are also monitored on a regular basis so problems can be addressed without delay. The program will undergo a full evaluation periodically in accordance with university policies on the review of academic programs.

Primary program faculty will meet at least once a semester to review the progress of the degree program and discuss any issues and potential improvements. Faculty will monitor student performance on the examinations given by the professional actuarial societies. Program faculty will meet with regional employers of actuaries to discuss how well the curriculum prepares students for the job market. Faculty will solicit feedback from graduates of the program

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