ACTUARIAL MATHEMATICS - B.S.

College of Arts and Sciences
Department of Mathematical Sciences
www.kent.edu/math

About This Program
The Bachelor of Science in Actuarial Mathematics program provides a strong foundation in mathematics and statistics, along with specialized coursework in actuarial science to prepare you for a successful career in this growing field. You'll learn from experienced faculty, gain hands-on experience through internships and research projects and have opportunities to network with professionals in the industry. Read more...

Contact Information
- Program Coordinator: Darci Kracht | dkracht@kent.edu | 330-672-9089
- Speak with an Advisor
- Chat with an Admissions Counselor

Program Delivery
- Delivery: In person
- Location: Kent Campus

Examples of Possible Careers and Salaries*

Actuaries
- 17.6% much faster than the average
- 27,700 number of jobs
- $111,030 potential earnings

Economists
- 14.1% much faster than the average
- 20,500 number of jobs
- $108,350 potential earnings

Financial and investment analysts, financial risk specialists, and financial specialists, all other
- 5.5% faster than the average
- 487,800 number of jobs
- $83,660 potential earnings

Mathematical science teachers, postsecondary
- 1.3% slower than the average
- 60,100 number of jobs
- $73,650 potential earnings

Insurance underwriters
- -6.2% decline
- 114,700 number of jobs
- $71,790 potential earnings

* Source of occupation titles and labor data comes from the U.S. Bureau of Labor Statistics’ Occupational Outlook Handbook. Data comprises projected percent change in employment over the next 10 years; nation-wide employment numbers; and the yearly median wage at which half of the workers in the occupation earned more than that amount and half earned less.

Admission Requirements
The university affirmatively strives to provide educational opportunities and access to students with varied backgrounds, those with special talents and adult students who graduated from high school three or more years ago.

First-Year Students on the Kent Campus: First-year admission policy on the Kent Campus is selective. Admission decisions are based upon cumulative grade point average, strength of high school college preparatory curriculum and grade trends. Students not admissible to the Kent Campus may be administratively referred to one of the seven regional campuses to begin their college coursework. For more information, visit the admissions website for first-year students.

First-Year Students on the Regional Campuses: First-year admission to Kent State's campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Twinsburg Academic Center, is open to anyone with a high school diploma or its equivalent. For more information on admissions, contact the Regional Campuses admissions offices.

International Students: All international students must provide proof of English language proficiency unless they meet specific exceptions. For more information, visit the admissions website for international students.

Transfer Students: Students who have attended any other educational institution after graduating from high school must apply as undergraduate transfer students. For more information, visit the admissions website for transfer students.

Former Students: Former Kent State students or graduates who have not attended another college or university since Kent State may complete the reenrollment or reinstatement form on the University Registrar’s website.

Admission policies for undergraduate students may be found in the University Catalog.

Some programs may require that students meet certain requirements before progressing through the program. For programs with progression requirements, the information is shown on the Coursework tab.

Program Requirements
Major Requirements

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<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tr>
<td>ACCT 23020</td>
<td>INTRODUCTION TO FINANCIAL ACCOUNTING ¹</td>
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FIN 36053 BUSINESS FINANCE 1 3
MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR) (min C grade) 5
MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II (min C grade) 5
MATH 20011 DECISION-MAKING UNDER UNCERTAINTY 3
MATH 21001 LINEAR ALGEBRA (min C grade) 3
MATH 22005 ANALYTIC GEOMETRY AND CALCULUS III (min C grade) 4
MATH 30055 MATHEMATICAL THEORY OF INTEREST (min C grade) 3
MATH 31011 PROOFS IN DISCRETE MATHEMATICS 3
MATH 32044 ORDINARY DIFFERENTIAL EQUATIONS 3
MATH 40011 PROBABILITY THEORY AND APPLICATIONS (min C grade) 3
MATH 40012 THEORY OF STATISTICS (WIC) 2 3
MATH 40055 ACTUARIAL MATHEMATICS I (ELR) (WIC) (min C grade) 4
MATH 40056 ACTUARIAL MATHEMATICS II 4
MATH 40059 STOCHASTIC ACTUARIAL MODELS 3

Computer Science Elective, choose from the following: 4
CS 10062 PROGRAMMING FOR PROBLEM SOLVING IN SCIENCES
CS 13001 COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING
CS 13011 COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING

Mathematics Electives, choose from the following: 6
MATH 40015 APPLIED STATISTICS
MATH 40024 COMPUTATIONAL STATISTICS
MATH 40028 STATISTICAL LEARNING
MATH 40051 TOPICS IN PROBABILITY THEORY AND STOCHASTIC PROCESSES
MATH 41021 THEORY OF MATRICES
MATH 42001 ANALYSIS I (ELR) (WIC) 2
MATH 42002 ANALYSIS II (ELR) (WIC) 2
MATH 42011 MATHEMATICAL OPTIMIZATION
MATH 42021 GRAPH THEORY AND COMBINATORICS
MATH 42031 MATHEMATICAL MODELS AND DYNAMICAL SYSTEMS
MATH 42039 MODELING PROJECTS (ELR) (WIC) 2
MATH 42041 ADVANCED CALCULUS
MATH 42045 PARTIAL DIFFERENTIAL EQUATIONS
MATH 42048 COMPLEX VARIABLES
MATH 42201 NUMERICAL COMPUTING I
MATH 42202 NUMERICAL COMPUTING II
MATH 45011 DIFFERENTIAL GEOMETRY

Allied Area Elective, choose from the following: 3 3
ACCT 33001 INTERMEDIATE FINANCIAL ACCOUNTING I
ACCT 33004 INTRODUCTION TO ACCOUNTING SYSTEMS
ACCT 33010 COST ACCOUNTING
ACCT 33012 INTERMEDIATE FINANCIAL ACCOUNTING II
ACCT 43020 ADVANCED FINANCIAL ACCOUNTING
ACCT 43089 INTERNATIONAL ACCOUNTING EXPERIENCE (ELR)
BA 34060 OPERATIONS MANAGEMENT
BSCI 30050 HUMAN GENETICS

BSCI 40020 BIOLOGY OF AGING
BUS 30189 INTERNATIONAL BUSINESS EXPERIENCE (ELR)
BUS 30234 INTERNATIONAL BUSINESS
CHEM 30050 INTRODUCTION TO MATERIALS CHEMISTRY
CHEM 30105 ANALYTICAL CHEMISTRY I
CHEM 30106 ANALYTICAL CHEMISTRY II
CHEM 30301 INORGANIC CHEMISTRY I
CHEM 40302 INORGANIC CHEMISTRY II
CHEM 40303 INORGANIC CHEMISTRY III
CHEM 40555 PHYSICAL CHEMISTRY I
CHEM 40556 PHYSICAL CHEMISTRY II
CHEM 40559 NANOMATERIALS
CIS 34032 DATA AND FILE TECHNOLOGY
CIS 44043 DATA MANAGEMENT AND BUSINESS INTELLIGENCE I
CIS 44045 INFORMATION SYSTEMS MANAGEMENT
CIS 44048 CLOUD SYSTEMS INTEGRATION (ELR) (WIC) 2
CS 33007 INTRODUCTION TO DATABASE SYSTEM DESIGN
CS 33101 STRUCTURE OF PROGRAMMING LANGUAGES
CS 33211 OPERATING SYSTEMS
CS 33901 SOFTWARE ENGINEERING
CS 35101 COMPUTER ORGANIZATION
CS 35201 COMPUTER COMMUNICATION NETWORKS
CS 38101 INTRODUCTION TO GAME PROGRAMMING
CS 43006 THEORY OF OBJECT-ORIENTED PROGRAMMING
CS 43111 STRUCTURE OF COMPILERS
CS 43202 SYSTEMS ADMINISTRATION
CS 43203 SYSTEMS PROGRAMMING
CS 43301 SOFTWARE DEVELOPMENT FOR ROBOTICS
CS 43305 ADVANCED DIGITAL DESIGN
CS 43401 SECURE PROGRAMMING
CS 44001 COMPUTER SCIENCE III-PROGRAMMING PATTERNS
CS 44003 MOBILE APPS IN IOS PROGRAMMING
CS 44105 WEB PROGRAMMING I
CS 44106 WEB PROGRAMMING II
CS 44201 ARTIFICIAL INTELLIGENCE
CS 45203 COMPUTER NETWORK SECURITY
CS 45231 INTERNET ENGINEERING
CS 46101 DESIGN AND ANALYSIS OF ALGORITHMS
CS 47101 COMPUTER GRAPHICS
CS 47205 INFORMATION SECURITY
CS 47206 DATA SECURITY AND PRIVACY
CS 47207 DIGITAL FORENSICS
CS 47221 INTRODUCTION TO CRYPTOLOGY
CS 48101 GAME ENGINE CONCEPTS
ECON 32025 MONEY, CREDIT AND BANKING
ECON 32040 INTERMEDIATE MICROECONOMIC THEORY AND APPLICATIONS
ECON 32041 INTERMEDIATE MACROECONOMIC THEORY AND POLICY
ECON 32051 APPLIED ECONOMETRICS II
ECON 42050 DATA ACQUISITION, PREPARATION AND VISUALIZATION
ECON 42065 PROBLEMS OF MONETARY AND FISCAL POLICY

HUMAN GENETICS
OPERATIONS MANAGEMENT
INTERNATIONAL ACCOUNTING EXPERIENCE
ADVANCED FINANCIAL ACCOUNTING
INTERMEDIATE FINANCIAL ACCOUNTING II
DIFFERENTIAL GEOMETRY
NUMERICAL COMPUTING II
NUMERICAL COMPUTING I
PARTIAL DIFFERENTIAL EQUATIONS
ADVANCED CALCULUS
MODELING PROJECTS (ELR) (WIC)
SYSTEMS
MATHEMATICAL MODELS AND DYNAMICAL SYSTEMS
GRAPH THEORY AND COMBINATORICS
ANALYSIS I (WIC)
ANALYSIS II (WIC)
MATHEMATICAL OPTIMIZATION
GRAPH THEORY AND COMBINATORICS
MATHEMATICAL MODELS AND DYNAMICAL SYSTEMS
MODELING PROJECTS (ELR)
ADVANCED CALCULUS
PARTIAL DIFFERENTIAL EQUATIONS
COMPLEX VARIABLES
NUMERICAL COMPUTING I
NUMERICAL COMPUTING II
DIFFERENTIAL GEOMETRY
INTERMEDIATE FINANCIAL ACCOUNTING I
INTRODUCTION TO ACCOUNTING SYSTEMS
COST ACCOUNTING
INTERMEDIATE FINANCIAL ACCOUNTING II
ADVANCED FINANCIAL ACCOUNTING
INTERNATIONAL ACCOUNTING EXPERIENCE (ELR)
OPERATIONS MANAGEMENT
HUMAN GENETICS
ECON 42070  GAME THEORY
ECON 42085  PUBLIC ECONOMICS: GOVERNMENT AND POLICY
ECON 42086  ECONOMICS OF HEALTH CARE
ESCI 31080  STRUCTURAL GEOLOGY
ESCI 32066  GEOMORPHOLOGY
ESCI 41025  GENERAL GEOPHYSICS
ESCI 41080  TECTONICS AND OROGENY
ESCI 42030  REMOTE SENSING
ESCI 42035  DATA ANALYSIS IN THE EARTH SCIENCES
FIN 36054  INTERMEDIATE CORPORATE FINANCE
FIN 36059  INTERMEDIATE INVESTMENTS
FIN 36081  PRINCIPLES OF INSURANCE
FIN 36086  ADVANCED FINANCIAL MODELING
FIN 46054  FINANCIAL RISK MANAGEMENT
FIN 46055  ADVANCED DERIVATIVE SECURITIES
FIN 46064  INTERNATIONAL BUSINESS FINANCE
FIN 46067  ADVANCED PORTFOLIO ANALYSIS
FIN 46089  INTERNATIONAL FINANCE EXPERIENCE (ELR)
GEOG 31062  FUNDAMENTALS OF METEOROLOGY
GEOG 31064  CLIMATE AND THE ENVIRONMENT
GEOG 35065  GEOGRAPHY OF TRANSPORTATION AND SPATIAL INTERACTION
GEOG 39002  STATISTICAL METHODS IN GEOGRAPHY
GEOG 41065  APPLIED CLIMATOLOGY
GEOG 44070  SPATIAL ANALYSIS AND LOCATION THEORY
GEOG 49070  GEOGRAPHIC INFORMATION SCIENCE
GEOG 49080  ADVANCED GEOGRAPHIC INFORMATION SCIENCE
GEOG 49085  WEB AND MOBILE GEOGRAPHIC INFORMATION SCIENCE
GEOG 49162  CARTOGRAPHY
GEOG 49230  REMOTE SENSING
MATH 40015  APPLIED STATISTICS
MATH 40024  COMPUTATIONAL STATISTICS
MATH 40028  STATISTICAL LEARNING
MATH 40051  TOPICS IN PROBABILITY THEORY AND STOCHASTIC PROCESSES
MATH 41001  MODERN ALGEBRA I (ELR) (WIC) 2
MATH 41002  MODERN ALGEBRA II (ELR) (WIC) 2
MATH 41021  THEORY OF MATRICES
MATH 42001  ANALYSIS I (ELR) (WIC) 2
MATH 42002  ANALYSIS II (ELR) (WIC) 2
MATH 42011  MATHEMATICAL OPTIMIZATION
MATH 42021  GRAPH THEORY AND COMBINATORICS
MATH 42031  MATHEMATICAL MODELS AND DYNAMICAL SYSTEMS
MATH 42039  MODELING PROJECTS (ELR) (WIC) 2
MATH 42041  ADVANCED CALCULUS
MATH 42045  PARTIAL DIFFERENTIAL EQUATIONS
MATH 42048  COMPLEX VARIABLES
MATH 42201  NUMERICAL COMPUTING I
MATH 42202  NUMERICAL COMPUTING II
MATH 45011  DIFFERENTIAL GEOMETRY
MATH 45021  EUCLIDEAN GEOMETRY
MATH 45022  LINEAR GEOMETRY
MATH 46001  ELEMENTARY TOPOLOGY
MATH 47011  THEORY OF NUMBERS
MATH 47021  HISTORY OF MATHEMATICS
MATH 49992  INTERNSHIP IN MATHEMATICS (ELR)
PHIL 41035  PHILOSOPHY OF SCIENCE
PHIL 41038  INTERMEDIATE LOGIC
PHIL 41045  METALOGIC
PHY 34000  COSMOLOGY
PHY 35101  CLASSICAL MECHANICS
PHY 36001  INTRODUCTORY MODERN PHYSICS
PHY 36002  APPLICATIONS OF MODERN PHYSICS
PHY 44802  ASTROPHYSICS
PHY 45201  ELECTROMAGNETIC THEORY
PHY 45301  THERMAL PHYSICS
PHY 45401  MATHEMATICAL METHODS IN PHYSICS
PHY 45403  DATA ANALYSIS AND COMPUTATIONAL PHYSICS TECHNIQUES
PHY 45501  ELECTROMAGNETIC WAVES AND MODERN OPTICS
PHY 46101  QUANTUM MECHANICS
PHY 46301  INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS
PHY 46401  INTRODUCTION TO SOLID STATE PHYSICS

Additional Requirements (courses do not count in major GPA)

COMM 15000  INTRODUCTION TO HUMAN COMMUNICATION (KADL) 3
UC 10001  FLASHES 101 1

Foreign Language Requirement (see Foreign Language College Requirement)
Kent Core Composition 6
Kent Core Humanities and Fine Arts (minimum one course from each) 9
Kent Core Social Sciences (must be from two disciplines) 3
Kent Core Basic Sciences (must include one laboratory) 6-7

General Electives (total credit hours depends on earning 120 credits hour, including 39 upper-division credit hours)
Minimum Total Credit Hours: 120

1 Students who earn a minimum B- grade in ACCT 23020, ECON 22060, ECON 22061 and FIN 36053 will fulfill the Validation by Educational Experience (VEE) requirements jointly sponsored by the Society of Actuaries, Casualty Actuarial Society and Canadian Institute of Actuaries.
2 A minimum C grade must be earned to fulfill the writing-intensive requirement.
3 A course may only count for one requirement even though it may appear in more than one course list.

Graduation Requirements

Minimum Major GPA 2.000
Minimum Overall GPA 2.000

Foreign Language College Requirement, B.S.

- Students pursuing the Bachelor of Science degree in the College of Arts and Sciences must complete 8 credit hours of foreign language. 1
- The Bachelor of Science in Medical Laboratory Science is exempt from this requirement. 2
- Minimum Elementary I and II of the same language
All students with prior foreign language experience should take the foreign language placement test to determine the appropriate level at which to start. Some students may start beyond the Elementary I level and will complete the requirement with fewer credit hours and fewer courses. This may be accomplished by (1) passing a course beyond Elementary I through Intermediate II level; (2) receiving credit through one of the alternative credit programs offered by Kent State University; or (3) demonstrating language proficiency comparable to Elementary II of a foreign language. When students complete the requirement with fewer than 8 credit hours and two courses, they will complete remaining credit hours with general electives.

The Bachelor of Science in Medical Laboratory Science exemption exists under another college policy (Three-Plus-One Programs).

### Roadmap

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

**Semester One**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>COMM 15000</td>
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<tr>
<td>MATH 12002</td>
<td>ANALYTIC GEOMETRY AND CALCULUS I (KMCR)</td>
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<td>UC 10001</td>
<td>FLASHERS 101</td>
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<td>ANALYTIC GEOMETRY AND CALCULUS III</td>
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<td>MATHEMATICAL THEORY OF INTEREST</td>
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<td>MATH 31011</td>
<td>PROOFS IN DISCRETE MATHEMATICS</td>
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<td>Foreign Language</td>
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<td>MATH 32044</td>
<td>ORDINARY DIFFERENTIAL EQUATIONS</td>
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<td>MATH 40011</td>
<td>PROBABILITY THEORY AND APPLICATIONS</td>
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**Semester Eight**

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**Minimum Total Credit Hours**: 120

### University Requirements

All students in a bachelor's degree program at Kent State University must complete the following university requirements for graduation.

**NOTE:** University requirements may be fulfilled in this program by specific course requirements. Please see Program Requirements for details.

**Flashes 101 (UC 10001)**

- 1 credit hour
  - Course is not required for students with 30+ transfer credits (excluding College Credit Plus) or age 21+ at time of admission.

**Diversity Domestic/Global (DIVD/DIVG)**

- 2 courses
  - Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.

**Experiential Learning Requirement (ELR)**

- Varies
  - Students must successfully complete one course or approved experience.

**Kent Core (see table below)**

- 36-37 credit hours

**Writing-Intensive Course (WIC)**

- 1 course
  - Students must earn a minimum C grade in the course.

**Upper-Division Requirement**

- 39 credit hours
  - Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate.

**Total Credit Hour Requirement**

- 120 credit hours

### Kent Core Requirements

**Kent Core Composition (KCMP)**

- 6

**Kent Core Mathematics and Critical Reasoning (KMCR)**

- 3

**Kent Core Humanities and Fine Arts (KHUM/KFA) (min one course each)**

- 9

**Kent Core Social Sciences (KSS) (must be from two disciplines)**

- 6

**Kent Core Basic Sciences (KBS/KLAB) (must include one laboratory)**

- 6-7

**Kent Core Additional (KADL)**

- 6

**Total Credit Hours**

- 36-37
Program Learning Outcomes
Graduates of this 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.

Full Description
The Bachelor of Science degree in Actuarial Mathematics prepares students for the actuarial profession. Actuaries are professionals who manage risk. They predict the likelihood of future events and model the financial impact of future scenarios. They find creative ways to mitigate the undesirable effects of future events. Although most actuaries are employed in the insurance and financial industries, many others work in the transportation, environmental, medical and manufacturing industries, as well as in government.

The Actuarial Mathematics major is highly interdisciplinary, integrating substantial coursework in business, computing and communications with a solid core of mathematics and statistics. Kent State University is one of only four institutions in Ohio to receive the "Universities and Colleges with Actuarial Programs-Advanced Curriculum" designation from the Society of Actuaries. The Kent State program prepares students for the first four of a series of examinations to receive professional certification as an actuary.