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.

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 23020</td>
<td>INTRODUCTION TO FINANCIAL ACCOUNTING</td>
<td>3</td>
</tr>
<tr>
<td>ECON 22060</td>
<td>PRINCIPLES OF MICROECONOMICS (KSS)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 22061</td>
<td>PRINCIPLES OF MACROECONOMICS (KSS)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 32050</td>
<td>APPLIED ECONOMETRICS I (ELR)</td>
<td>3</td>
</tr>
</tbody>
</table>

Actuarial Mathematics - B.S.
### Allied Area Elective

Choose from the following:

- **MATH 20011** Decision-Making Under Uncertainty (3 credits)
- **MATH 21001** Linear Algebra (min C grade) (3 credits)
- **MATH 22005** Analytic Geometry and Calculus III (min C grade) (4 credits)
- **MATH 30055** Mathematical Theory of Interest (min C grade) (3 credits)
- **MATH 31011** Ordinary Differential Equations (3 credits)
- **MATH 40011** Probability Theory and Applications (min C grade) (3 credits)
- **MATH 40012** Theory of Statistics (WIC) (3 credits)
- **MATH 40055** Actuarial Mathematics I (ELR) (WIC) (min C grade) (4 credits)
- **MATH 40056** Actuarial Mathematics II (Actuarial Mathematics II) (4 credits)
- **MATH 40059** Stochastic Actuarial Models (3 credits)

### Computer Science Elective

Choose from the following:

- **CS 10062** Programming for Problem Solving in Sciences (4 credits)
- **CS 13001** Computer Science I: Programming and Problem Solving (4 credits)
- **CS 13011** Computer Science IA: Procedural Programming and Computer Science IB: Object-Oriented Programming (6 credits)

### Mathematics Elective

Choose from the following:

- **MATH 40015** Applied Statistics (3 credits)
- **MATH 40024** Computational Statistics (3 credits)
- **MATH 40028** Statistical Learning (3 credits)
- **MATH 40051** Topics in Probability Theory and Stochastic Processes (3 credits)
- **MATH 41021** Theory of Matrices (3 credits)
- **MATH 42001** Analysis I (ELR) (WIC) (3 credits)
- **MATH 42002** Analysis II (ELR) (WIC) (3 credits)
- **MATH 42011** Mathematical Optimization (3 credits)
- **MATH 42021** Graph Theory and Combinatorics (3 credits)
- **MATH 42031** Mathematical Models and Dynamical Systems (3 credits)
- **MATH 42039** Modeling Projects (ELR) (WIC) (3 credits)
- **MATH 42041** Advanced Calculus (3 credits)
- **MATH 42045** Partial Differential Equations (3 credits)
- **MATH 42048** Complex Variables (3 credits)
- **MATH 42201** Numerical Computing I (3 credits)
- **MATH 42202** Numerical Computing II (3 credits)
- **MATH 45011** Differential Geometry (3 credits)

### Allied Area Elective

Choose from the following:

- **ACCT 33001** Intermediate Financial Accounting I (3 credits)
- **ACCT 33004** Introduction to Accounting Systems (3 credits)
- **ACCT 33010** Cost Accounting (3 credits)
- **ACCT 33012** Intermediate Financial Accounting II (3 credits)
- **ACCT 43020** Advanced Financial Accounting (3 credits)
- **ACCT 43089** International Accounting Experience (ELR) (3 credits)
- **BA 34060** Operations Management (3 credits)
- **BSCI 30050** Human Genetics (3 credits)

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**FIN 36053** Business Finance (1 credit)

**MATH 12002** Analytic Geometry and Calculus I (KMCRI) (min C grade) (5 credits)

**MATH 12003** Analytic Geometry and Calculus II (min C grade) (5 credits)

**MATH 20011** Decision-Making Under Uncertainty (3 credits)

**MATH 21001** Linear Algebra (min C grade) (3 credits)

**MATH 22005** Analytic Geometry and Calculus III (min C grade) (4 credits)

**MATH 30055** Mathematical Theory of Interest (min C grade) (3 credits)

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- **BA 34060** Operations Management (3 credits)
- **BSCI 30050** Human Genetics (3 credits)
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 FLASHERS 101 (KADL) 1

Foreign Language Requirement (see Foreign Language College Requirement) 8

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) 10

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.
- The Bachelor of Science in Medical Laboratory Science is exempt from this requirement.
- 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.

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 15000</td>
<td>3</td>
</tr>
<tr>
<td>INTRODUCTION TO HUMAN COMMUNICATION (KADL)</td>
<td></td>
</tr>
<tr>
<td>MATH 12002</td>
<td>5</td>
</tr>
<tr>
<td>ANALYTIC GEOMETRY AND CALCULUS I (KMCR)</td>
<td></td>
</tr>
<tr>
<td>UC 10001</td>
<td>1</td>
</tr>
<tr>
<td>FLASHES 101</td>
<td></td>
</tr>
<tr>
<td>Computer Science Elective</td>
<td>4</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td><strong>Credit Hours</strong></td>
<td><strong>16</strong></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Semester Two</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 12003</td>
<td>5</td>
</tr>
<tr>
<td>ANALYTIC GEOMETRY AND CALCULUS II</td>
<td></td>
</tr>
<tr>
<td>MATH 20011</td>
<td>3</td>
</tr>
<tr>
<td>DECISION-MAKING UNDER UNCERTAINTY</td>
<td></td>
</tr>
<tr>
<td>MATH 21001</td>
<td>3</td>
</tr>
<tr>
<td>LINEAR ALGEBRA</td>
<td></td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
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<tr>
<td><strong>Credit Hours</strong></td>
<td><strong>17</strong></td>
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<table>
<thead>
<tr>
<th>Semester Three</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ECON 22060</td>
<td>3</td>
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<tr>
<td>PRINCIPLES OF MICROECONOMICS (KSS)</td>
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<tr>
<td>MATH 22005</td>
<td>4</td>
</tr>
<tr>
<td>ANALYTIC GEOMETRY AND CALCULUS III</td>
<td></td>
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<tr>
<td>MATH 30055</td>
<td>3</td>
</tr>
<tr>
<td>MATHEMATICAL THEORY OF INTEREST</td>
<td></td>
</tr>
<tr>
<td>MATH 31011</td>
<td>3</td>
</tr>
<tr>
<td>PROOFS IN DISCRETE MATHEMATICS</td>
<td></td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td><strong>Credit Hours</strong></td>
<td><strong>17</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Semester Four</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ECON 22061</td>
<td>3</td>
</tr>
<tr>
<td>PRINCIPLES OF MACROECONOMICS (KSS)</td>
<td></td>
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<tr>
<td>MATH 32044</td>
<td>3</td>
</tr>
<tr>
<td>ORDINARY DIFFERENTIAL EQUATIONS</td>
<td></td>
</tr>
<tr>
<td>MATH 40011</td>
<td>3</td>
</tr>
<tr>
<td>PROBABILITY THEORY AND APPLICATIONS</td>
<td></td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td><strong>Credit Hours</strong></td>
<td><strong>16</strong></td>
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<table>
<thead>
<tr>
<th>Semester Five</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACCT 23020</td>
<td>3</td>
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<tr>
<td>INTRODUCTION TO FINANCIAL ACCOUNTING</td>
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<tr>
<td>MATH 40055</td>
<td>4</td>
</tr>
<tr>
<td>ACTUARIAL MATHEMATICS I (ELR) (WIC)</td>
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</tr>
<tr>
<td>Mathematics Elective</td>
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</tr>
<tr>
<td>Kent Core Requirement</td>
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<tr>
<td><strong>Credit Hours</strong></td>
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<th>Semester Six</th>
<th>Credits</th>
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<tr>
<td>FIN 36053</td>
<td>3</td>
</tr>
<tr>
<td>BUSINESS FINANCE</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashes 101 (UC 10001)</td>
<td>1</td>
</tr>
<tr>
<td>Course is not required for students with 30+ transfer credits (excluding College Credit Plus) or age 21+ at time of admission.</td>
<td></td>
</tr>
<tr>
<td>Diversity Domestic/Global (DIVD/DIVG)</td>
<td>2</td>
</tr>
<tr>
<td>Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.</td>
<td></td>
</tr>
<tr>
<td>Experiential Learning Requirement (ELR)</td>
<td>varies</td>
</tr>
<tr>
<td>Students must successfully complete one course or approved experience.</td>
<td></td>
</tr>
<tr>
<td>Kent Core (see table below)</td>
<td>36-37</td>
</tr>
<tr>
<td>Kent Core Composition (KCMP)</td>
<td>6</td>
</tr>
<tr>
<td>Kent Core Mathematics and Critical Reasoning (KMCR)</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Humanities and Fine Arts (KHUM/KFA) (min one course each)</td>
<td>9</td>
</tr>
<tr>
<td>Kent Core Social Sciences (KSS) (must be from two disciplines)</td>
<td>6</td>
</tr>
<tr>
<td>Kent Core Basic Sciences (KBS/KLAB) (must include one laboratory)</td>
<td>6-7</td>
</tr>
<tr>
<td>Kent Core Additional (KADL)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Credit Hour Requirement</strong></td>
<td>120</td>
</tr>
</tbody>
</table>

Kent Core Requirements

**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.