

ACTUARIAL MATHEMATICS - B.S.

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

Contact Information

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- Speak with an Advisor
- Chat with an Admissions Counselor

Fully Offered

- Kent Campus

Examples of Possible Careers*

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

*Note

Source of occupation titles and labor data is 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.

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.

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.

Freshman Students on the Kent Campus: The freshman admission policy on the Kent Campus is selective. Admission decisions are based upon the following: cumulative grade point average, ACT and/or SAT scores, strength of high school college preparatory curriculum and grade trends. The Admissions Office at the Kent Campus may defer the admission of students who do not meet admissions criteria but who demonstrate areas of promise for successful college study. Deferred applicants may begin their college coursework at one of seven regional campuses of Kent State University. For more information on admissions, including additional requirements for some academic programs, visit the admissions website for first-year students.

Freshman Students on the Regional Campuses: Kent State campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Twinsburg Academic Center, have open enrollment admission for students who hold a high school diploma, GED or equivalent.

English Language Proficiency Requirements for International Students: All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 525 TOEFL score (71 on the Internet-based version), minimum 75 MELAB score, minimum 6.0 IELTS score, minimum 48 PTE score or minimum 100 DET score; or by completing the ESL level 112 Intensive Program. For more information on international admission, visit the Office of Global Education's admission website.

Transfer, Transitioning and Former Students: For more information about admission criteria for transfer, transitioning and former students, please visit the admissions website.

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.

- Engage effectively in problem solving by exploring examples, assessing the correctness of solutions and interpreting solutions in an actuarial context.
- Define, interpret and apply standard actuarial notation, terminology and formulas.
- Analyze various streams of cash flows, both certain and contingent.
- Apply methods from probability, statistics and stochastic processes to the solution of problems in actuarial science, finance and economics.
- Communicate solutions of mathematical problems clearly, both orally and in writing.
- Employ commonly used computer programming languages and software packages to solve problems in actuarial science, finance and economics.
- Demonstrate fundamental knowledge of finance, economics and accounting.

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.

| | |
|---|------------|
| Destination Kent State: First Year Experience | 1 |
| Course is not required for students with 25 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 |
| Writing-Intensive Course (WIC) | 1 course |
| Students must earn a minimum C grade in the course. | |
| Upper-Division Requirement | 39 (or 42) |
| Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate. Students in a B.A. and/or B.S. degree in the College of Arts and Sciences must complete 42 upper-division credit hours. | |
| Total Credit Hour Requirement | 120 |
| Some bachelor's degrees require students to complete more than 120 credit hours. | |

Kent Core Requirements

| | |
|---|--------------|
| Kent Core Composition (KCOMP) | 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 Requirements

Major Requirements

| Code | Title | Credit Hours |
|--|--|--------------|
| Major Requirements (courses count in major GPA) | | |
| ACCT 23020 | INTRODUCTION TO FINANCIAL ACCOUNTING ¹ | 3 |
| ECON 22060 | PRINCIPLES OF MICROECONOMICS (KSS) ¹ | 3 |
| ECON 22061 | PRINCIPLES OF MACROECONOMICS (KSS) ¹ | 3 |
| ECON 32050 | APPLIED ECONOMETRICS I (ELR) | 3 |
| 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 | 3 |
| MATH 40055 | ACTUARIAL MATHEMATICS I (ELR) (WIC) (min C grade) ² | 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 & CS 13012 | 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

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| 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) |
| 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 34068 | SYSTEMS ANALYSIS AND DESIGN |
| CIS 34070 | PROGRAMMING THEORY AND APPLICATIONS |
| CIS 44033 | ADVANCED COMPUTER PROGRAMMING FOR BUSINESS |
| CIS 44043 | DATA MANAGEMENT AND BUSINESS INTELLIGENCE I |
| CIS 44045 | INFORMATION SYSTEMS MANAGEMENT |
| CIS 44048 | CLOUD SYSTEMS INTEGRATION (ELR) (WIC) |
| 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 |

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| 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 |
| ECON 42070 | GAME THEORY |
| ECON 42085 | PUBLIC ECONOMICS: GOVERNMENT AND POLICY |
| ECON 42086 | ECONOMICS OF HEALTH CARE |
| FIN 36054 | INTERMEDIATE CORPORATE FINANCE |
| FIN 36059 | INTERMEDIATE INVESTMENTS |
| FIN 36081 | PRINCIPLES OF INSURANCE |
| FIN 36085 | 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 | PRINCIPLES OF CLIMATOLOGY |
| 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 |
| GEOL 31080 | STRUCTURAL GEOLOGY |
| GEOL 32066 | GEOMORPHOLOGY |
| GEOL 41025 | GENERAL GEOPHYSICS |
| GEOL 41080 | TECTONICS AND OROGENY |
| GEOL 42030 | REMOTE SENSING |
| GEOL 42035 | SCIENTIFIC METHODS IN GEOLOGY |
| 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) |
| MATH 41002 | MODERN ALGEBRA II (ELR) (WIC) |
| MATH 41021 | THEORY OF MATRICES |
| MATH 42001 | ANALYSIS I (ELR) (WIC) |
| MATH 42002 | ANALYSIS II (ELR) (WIC) |
| MATH 42011 | MATHEMATICAL OPTIMIZATION |
| MATH 42021 | GRAPH THEORY AND COMBINATORICS |

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| MATH 42031 | MATHEMATICAL MODELS AND DYNAMICAL SYSTEMS | |
| MATH 42039 | MODELING PROJECTS (ELR) (WIC) | |
| 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) | |
| MGMT 34060 | OPERATIONS MANAGEMENT | |
| 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 10097 | DESTINATION KENT STATE: FIRST YEAR EXPERIENCE | 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 credit hours, including 42 upper-division credit hours) | | 10 |
| Minimum Total Credit Hours: | | 120 |

¹ These courses with a minimum B- grade 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 course 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 | Minimum Overall GPA |
|-------------------|---------------------|
| 2.000 | 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
- Minimum Elementary I and II of the same language

¹ 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.

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 | | Credits |
|---------------------------|---|---------|
| COMM 15000 | INTRODUCTION TO HUMAN COMMUNICATION (KADL) | 3 |
| MATH 12002 | ANALYTIC GEOMETRY AND CALCULUS I (KMCR) | 5 |
| UC 10097 | DESTINATION KENT STATE: FIRST YEAR EXPERIENCE | 1 |
| Computer Science Elective | | 4 |
| Kent Core Requirement | | 3 |
| Credit Hours | | 16 |
| Semester Two | | |
| MATH 12003 | ANALYTIC GEOMETRY AND CALCULUS II | 5 |
| MATH 20011 | DECISION-MAKING UNDER UNCERTAINTY | 3 |
| MATH 21001 | LINEAR ALGEBRA | 3 |
| Kent Core Requirement | | 3 |
| Kent Core Requirement | | 3 |
| Credit Hours | | 17 |
| Semester Three | | |
| ECON 22060 | PRINCIPLES OF MICROECONOMICS (KSS) | 3 |
| MATH 22005 | ANALYTIC GEOMETRY AND CALCULUS III | 4 |
| MATH 30055 | MATHEMATICAL THEORY OF INTEREST | 3 |
| MATH 31011 | PROOFS IN DISCRETE MATHEMATICS | 3 |
| Foreign Language | | 4 |
| Credit Hours | | 17 |
| Semester Four | | |
| ECON 22061 | PRINCIPLES OF MACROECONOMICS (KSS) | 3 |
| MATH 32044 | ORDINARY DIFFERENTIAL EQUATIONS | 3 |
| MATH 40011 | PROBABILITY THEORY AND APPLICATIONS | 3 |
| Kent Core Requirement | | 3 |
| Foreign Language | | 4 |
| Credit Hours | | 16 |
| Semester Five | | |
| ACCT 23020 | INTRODUCTION TO FINANCIAL ACCOUNTING | 3 |

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|-----------------------|-------------------------------------|-----|
| MATH 40055 | ACTUARIAL MATHEMATICS I (ELR) (WIC) | 4 |
| | Mathematics Elective | 3 |
| | Kent Core Requirement | 3 |
| | Credit Hours | 13 |
| Semester Six | | |
| FIN 36053 | BUSINESS FINANCE | 3 |
| MATH 40012 | THEORY OF STATISTICS | 3 |
| MATH 40056 | ACTUARIAL MATHEMATICS II | 4 |
| | Kent Core Requirement | 3 |
| | Kent Core Requirement | 3 |
| | Credit Hours | 16 |
| Semester Seven | | |
| | Allied Area Elective | 3 |
| | Mathematics Elective | 3 |
| | Kent Core Requirement | 3 |
| | General Electives | 6 |
| | Credit Hours | 15 |
| Semester Eight | | |
| ECON 32050 | APPLIED ECONOMETRICS I (ELR) | 3 |
| MATH 40059 | STOCHASTIC ACTUARIAL MODELS | 3 |
| | General Electives | 4 |
| | Credit Hours | 10 |
| | Minimum Total Credit Hours: | 120 |