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 will 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

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- 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.

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 proficiency of the English language (unless they meet specific exceptions) through the submission of an English language proficiency test score or by completing English language classes at Kent State's English as a Second Language Center before entering their program. For more information, visit the admissions website for international students.

Former Students: Former Kent State students who have not attended another institution since Kent State and were not academically dismissed will complete the re-enrollment process through the Financial, Billing and Enrollment Center. Former students who attended another college or university since leaving Kent State must apply for admissions as a transfer or post-undergraduate student.

Transfer Students: Students who attended an educational institution after graduating from high school or earning their GED must apply as transfer students. For more information, visit the admissions website for transfer students.

Admission policies for undergraduate students may be found in the University Catalog's Academic Policies.

Students may be required to meet certain criteria to progress in their program. Any progression requirements will be listed on the program's Coursework tab

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 (WIC) [2]	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: [3]		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 LINEAR ALGEBRA	
MATH 42202	NUMERICAL APPROXIMATION AND OPTIMIZATION	
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 (DIVG) (ELR)	
BA 34060	OPERATIONS MANAGEMENT	
BSCI 30050	HUMAN GENETICS	
BSCI 40020	BIOLOGY OF AGING	
BUS 30189	INTERNATIONAL BUSINESS EXPERIENCE (DIVG) (ELR)	
BUS 30234	INTERNATIONAL BUSINESS	
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	DATABASE DESIGN AND DATA GOVERNANCE	
CIS 44046	HOW TO LEAD AND MANAGE DIGITAL TRANSFORMATION	
CIS 44048	BUILDING SOLUTIONS FOR BUSINESSES (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 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
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 (DIVG) (ELR)
GEOG 31062	FUNDAMENTALS OF METEOROLOGY
GEOG 31064	CLIMATE AND THE ENVIRONMENT
GEOG 39002	STATISTICAL METHODS IN GEOGRAPHY
GEOG 41065	DATA ANALYSIS FOR CLIMATE AND THE ENVIRONMENT
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 LINEAR ALGEBRA
MATH 42202	NUMERICAL APPROXIMATION AND OPTIMIZATION
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
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)		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 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	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]
- The following programs are exempt from this requirement: The Bachelor of Science in Cybercriminology and the Bachelor of Science in Medical Laboratory Science.[2]
- 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 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.

[2] The Bachelor of Science in Medical Laboratory Science exemption exists under another college policy (Three-Plus-One Programs). The Bachelor of Science in Cybercriminology exemption is due to its extensive collaboration with and contribution from the Information Technology program in the College of Applied and Technical Studies, which does not have a foreign language requirement.

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 10001	FLASHES 101	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
	Credit Hours	**14**
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
Foreign Language		4
Kent Core Requirement		3
	Credit Hours	**16**
Semester Five		
ACCT 23020	INTRODUCTION TO FINANCIAL ACCOUNTING	3
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 (WIC)	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
Kent Core Requirement		3
General Electives		4
	Credit Hours	**13**
	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.

Program Policies

Foreign Language Requirements

In general, students may elect any foreign language taught through the Department of Modern and Classical Language Studies. However, certain majors, concentrations and minors require specific languages or limit the languages from which students may choose. In addition, students who plan to pursue graduate study may need particular languages for that study. In such cases, students should seek the advice of the appropriate department before selecting a language.

Progress Toward Fulfillment

College of Arts and Sciences students are encouraged to begin meeting the foreign language requirement as early as possible in their program to ensure timely degree completion.

Mandatory Outcomes Assessment

In addition to the other General Requirements of the college, candidates for an undergraduate degree in the College of Arts and Sciences are required, as a condition of graduation, to participate in an outcomes assessment. These outcomes assessments are conducted by each undergraduate degree program in the College of Arts and Sciences.

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.

Students may apply early to the Master of Arts in Economics degree and double count 9 credit hours of graduate courses toward both degree programs. See the **Combined Bachelor's/Master's Degree Program Policy** in the University Catalog for more information.