MATHEMATICS - B.S.

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

About This Program
Gain a deep understanding of mathematical concepts and their practical applications, while learning from experienced faculty and utilizing state-of-the-art facilities. With a Mathematics B.S. degree from Kent State, you’ll be equipped with the skills needed to pursue a variety of careers in fields such as finance, education, research and more. Read more...

Contact Information
• Program Coordinator: Xiaoyu Zheng | xzheng3@kent.edu | 330-672-9089
• Speak with an Advisor
  • Kent Campus
  • Stark Campus
• Chat with an Admissions Counselor: Kent Campus | Regional Campuses

Program Delivery
• Delivery:
  • In person
• Location:
  • Kent Campus
  • Stark Campus

Examples of Possible Careers and Salaries* 

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

Mathematicians
• 3.0% about as fast as the average
• 2,900 number of jobs
• $110,860 potential earnings

Natural sciences managers
• 4.8% about as fast as the average
• 71,400 number of jobs
• $137,940 potential earnings

Secondary school teachers, except special and career/technical education
• 3.8% about as fast as the average
• 1,050,800 number of jobs
• $62,870 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>MATH 12002</td>
<td>ANALYTIC GEOMETRY AND CALCULUS I (KMCR)(min C grade)</td>
<td>5</td>
</tr>
<tr>
<td>MATH 12003</td>
<td>ANALYTIC GEOMETRY AND CALCULUS II (min C grade)</td>
<td>5</td>
</tr>
<tr>
<td>MATH 20011</td>
<td>DECISION-MAKING UNDER UNCERTAINTY</td>
<td>3</td>
</tr>
<tr>
<td>MATH 21001</td>
<td>LINEAR ALGEBRA (min C grade)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 22005</td>
<td>ANALYTIC GEOMETRY AND CALCULUS III (min C grade)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 31011</td>
<td>PROOFS IN DISCRETE MATHEMATICS (min C grade)</td>
<td>3</td>
</tr>
</tbody>
</table>
Allied Area Electives, choose from the following:

- Applied Mathematics Sequence, choose from the following:
  - MATH 32044 ORDINARY DIFFERENTIAL EQUATIONS 3
  - MATH 41001 MODERN ALGEBRA I (ELR) (WIC) (min C grade) 3
  - MATH 41002 MODERN ALGEBRA II (ELR) (WIC) 2 3
  - MATH 42012 THEORY OF MATRICES 3
  - MATH 42001 ANALYSIS I (ELR) (WIC) (min C grade) 2 3
  - MATH 42002 ANALYSIS II (ELR) (WIC) 2 3

- PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB) 5

Computer Science Elective(s), choose from the following:

- 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

Pure Mathematics Electives, choose from the following:

- MATH 42021 GRAPH THEORY AND COMBINATORICS
- MATH 42048 COMPLEX VARIABLES
- MATH 45011 DIFFERENTIAL GEOMETRY
- MATH 45021 EUCLIDEAN GEOMETRY
- MATH 45022 LINEAR GEOMETRY
- MATH 46001 ELEMENTARY TOPOLOGY
- MATH 47011 THEORY OF NUMBERS

Applied Mathematics Sequence, choose from the following: 6-8

- MATH 40011 & MATH 40012 PROBABILITY THEORY AND APPLICATIONS and THEORY OF STATISTICS (WIC) 2
- MATH 40055 & MATH 40056 ACTUARIAL MATHEMATICS I (ELR) (WIC) and ACTUARIAL MATHEMATICS II 2
- MATH 42031 & MATH 42039 MATHEMATICAL MODELS AND DYNAMICAL SYSTEMS and MODELING PROJECTS (ELR) (WIC) 2
- MATH 42041 & MATH 42045 ADVANCED CALCULUS and PARTIAL DIFFERENTIAL EQUATIONS
- MATH 42201 & MATH 42202 NUMERICAL COMPUTING I and NUMERICAL COMPUTING II

Allied Area Electives, choose from the following: 3

- BSCI 30050 HUMAN GENETICS
- BSCI 40020 BIOLOGY OF AGING
- 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 NANO MATERIALS
- 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 43302 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 45023 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 32040 INTERMEDIATE MICROECONOMIC THEORY AND APPLICATIONS
- ECON 32041 INTERMEDIATE MACROECONOMIC THEORY AND POLICY
- ECON 32050 APPLIED ECONOMETRICS I (ELR)
- ECON 32051 APPLIED ECONOMETRICS II
- ECON 42050 DATA ACQUISITION, PREPARATION AND VISUALIZATION
- ECON 42070 GAME THEORY
- ESCI 31080 STRUCTURAL GEOLOGY
- ESCI 32066 GEOMORPHOLOGY
- ESCI 41025 GENERAL GEOPHYSICS
- ESCI 41080 TECTONICS AND OROGENY
- ESCI 42030 REMOTE SENSING
- ESCI 42035 DATA TECTONICS AND OROGENY
- ESCI 42036 DATA ACQUISITION, PREPARATION AND VISUALIZATION
- 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 30055 MATHEMATICAL THEORY OF INTEREST
- MATH 38001 HANDS-ON MATHEMATICS
- MATH 40011 PROBABILITY THEORY AND APPLICATIONS
- MATH 40012 THEORY OF STATISTICS (WIC) 2
- MATH 40015 APPLIED STATISTICS
- MATH 40024 COMPUTATIONAL STATISTICS
- MATH 40025 STATISTICAL LEARNING
$$\text{MATH 40051}$$  TOPICS IN PROBABILITY THEORY AND
STOCHASTIC PROCESSES
$$\text{MATH 40055}$$  ACTUARIAL MATHEMATICS I (ELR) (WIC) $$^2$$
$$\text{MATH 40056}$$  ACTUARIAL MATHEMATICS II
$$\text{MATH 40059}$$  STOCHASTIC ACTUARIAL MODELS
$$\text{MATH 42011}$$  MATHEMATICAL OPTIMIZATION
$$\text{MATH 42021}$$  GRAPH THEORY AND COMBINATORICS
$$\text{MATH 42024}$$  NUMBERS AND GAMES
$$\text{MATH 42031}$$  MATHEMATICAL MODELS AND DYNAMICAL
SYSTEMS
$$\text{MATH 42039}$$  MODELING PROJECTS (ELR) (WIC) $$^2$$
$$\text{MATH 42041}$$  ADVANCED CALCULUS
$$\text{MATH 42045}$$  PARTIAL DIFFERENTIAL EQUATIONS
$$\text{MATH 42048}$$  COMPLEX VARIABLES
$$\text{MATH 42201}$$  NUMERICAL COMPUTING I
$$\text{MATH 42202}$$  NUMERICAL COMPUTING II
$$\text{MATH 45011}$$  DIFFERENTIAL GEOMETRY
$$\text{MATH 45021}$$  EUCLIDEAN GEOMETRY
$$\text{MATH 45022}$$  LINEAR GEOMETRY
$$\text{MATH 46001}$$  ELEMENTARY TOPOLOGY
$$\text{MATH 47011}$$  THEORY OF NUMBERS
$$\text{MATH 47021}$$  HISTORY OF MATHEMATICS
$$\text{MATH 49992}$$  INTERNSHIP IN MATHEMATICS (ELR)
$$\text{PHIL 41035}$$  PHILOSOPHY OF SCIENCE
$$\text{PHIL 41038}$$  INTERMEDIATE LOGIC
$$\text{PHIL 41045}$$  METALOGIC
$$\text{PHY 34001}$$  PHYSICS
$$\text{PHY 34002}$$  PHYSICS
$$\text{PHY 35101}$$  CLASSICAL MECHANICS
$$\text{PHY 36001}$$  INTRODUCTORY MODERN PHYSICS
$$\text{PHY 36002}$$  APPLICATIONS OF MODERN PHYSICS
$$\text{PHY 44802}$$  ASTROPHYSICS
$$\text{PHY 45201}$$  ELECTROMAGNETIC THEORY
$$\text{PHY 45301}$$  THERMAL PHYSICS
$$\text{PHY 45401}$$  MATHEMATICAL METHODS IN PHYSICS
$$\text{PHY 45403}$$  DATA ANALYSIS AND COMPUTATIONAL
PHYSICS TECHNIQUES
$$\text{PHY 45501}$$  ELECTROMAGNETIC WAVES AND MODERN
OPTICS
$$\text{PHY 46101}$$  QUANTUM MECHANICS
$$\text{PHY 46301}$$  INTRODUCTION TO NUCLEAR AND PARTICLE
PHYSICS
$$\text{PHY 46401}$$  INTRODUCTION TO SOLID STATE PHYSICS

Additional Requirements (courses do not count in major GPA)
$$\text{UC 10001}$$  FLASHES 101
Foreign Language (see Foreign Language College Requirement below) 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) 6
Kent Core Basic Sciences (must include one laboratory) 1
Kent Core Additional 6
General Electives (total credit hours depends on earning 120 credits
hour, including 39 upper-division credit hours) 12

Minimum Total Credit Hours: 120

1 A course may count toward only one requirement even though it may
appear in more than one course list.

2 A minimum C grade must be earned to fulfill the writing-intensive
requirement.

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 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.

2 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>! MATH 12002</td>
<td>ANALYTIC GEOMETRY AND CALCULUS I (KMC)</td>
</tr>
<tr>
<td>UC 10001</td>
<td>FLASHES 101</td>
</tr>
<tr>
<td>! Computer Science Elective(s)</td>
<td>4</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td><strong>Credit Hours</strong></td>
<td><strong>17</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Semester Two</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>! MATH 12003</td>
<td>ANALYTIC GEOMETRY AND CALCULUS II</td>
</tr>
<tr>
<td>MATH 20011</td>
<td>DECISION-MAKING UNDER UNCERTAINTY</td>
</tr>
<tr>
<td>! PHY 23101</td>
<td>GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td><strong>Credit Hours</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Three</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>! MATH 21001</td>
<td>LINEAR ALGEBRA</td>
</tr>
<tr>
<td>! MATH 22005</td>
<td>ANALYTIC GEOMETRY AND CALCULUS III</td>
</tr>
<tr>
<td>MATH 31011</td>
<td>PROOFS IN DISCRETE MATHEMATICS</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td><strong>Credit Hours</strong></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Four</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 32044</td>
<td>ORDINARY DIFFERENTIAL EQUATIONS</td>
</tr>
<tr>
<td>! MATH 41021</td>
<td>THEORY OF MATRICES</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.

**Flashes 101 (UC 10001)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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>1 credit hour</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.</td>
<td>2 courses</td>
</tr>
</tbody>
</table>

**Experiential Learning Requirement (ELR)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students must successfully complete one course or approved experience.</td>
<td>varies</td>
</tr>
</tbody>
</table>

**Kent Core (see table below)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>

**Total Credit Hours: 120**

### Program Learning Outcomes

Graduates of this program will be able to:

1. Reason in mathematical arguments at a level appropriate to the discipline, including using precise definitions, articulating assumptions and reasoning logically to conclusions.
2. Engage effectively in problem solving, including exploring examples, devising and testing conjectures and assessing the correctness of solutions.
3. Approach mathematical problems creatively, including trying multiple approaches and modifying problems when necessary to make them more tractable.
4. Communicate mathematics clearly both orally and in writing.
5. Understand and appreciate connections among different subdisciplines of mathematics.
6. Understand and appreciate connections between mathematics and other disciplines.
7. Be aware of and understand a broad range of mathematical subdisciplines.

### Full Description

The Bachelor of Science degree in Mathematics comprises core areas in algebra (number systems, equations, discrete structures), analysis (functions, limits, continuous processes), geometry (space, shape, form) and associated generalizations and abstractions.

The B.S. degree program is recommended for students interested in a flexible option of careers or graduate study in mathematics. Coupled with the Education minor, the program can lead to Ohio teacher licensure.

Students may apply early to the M.S.in Pure Mathematics program 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.