# APPLIED MATHEMATICS (PLEASE SEE NOTE BELOW)

## NOTE: Admission to this program was discontinued effective October 5, 2021 and a teach-out plan is in place for current students.

**Home Department:** Mathematics

**Department Head:**

Adam Salminen, Ph.D.
Room 2-100A AB, 810-762-9557
math@kettering.edu

## Applied Mathematics Program Curriculum Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **First Year Experience** | | |
| CILE-101 | First Year Foundations | 1 |
| **General Education** | | |
| COMM-101 | Rhetoric & Writing | 4 |
| ECON-201 | Economic Principles | 4 |
| LA-201 | Sophomore Seminar: Exploring the Human Condition | 4 |
| LA-489 | Sr. Seminar:Leadership, Ethics | 4 |
| Advanced Humanities Electives [1] | | 8 |
| Advanced Social Science Electives [1] | | 8 |
| **Total Credit Hours** | | **33** |

[1] Humanities and Social Science advanced electives must be selected from approved 300 and 400 level courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Computer Programming** | | |
| Select one of the following: | | 4 |
| CS-101 | Computing & Algorithms I | |
| ECE-101 | MATLAB and C Programming | |
| IME-211 | Algorithms and Computer Programming | |
| | *Credit Hours Subtotal:* | *4* |
| **Basic Science** | | |
| CHEM-135 & CHEM-136 | Principles of Chemistry and Principles of Chemistry Lab | 4 |
| PHYS-114 & PHYS-115 | Newtonian Mechanics and Newtonian Mechanics Laboratory | 4 |
| PHYS-224 & PHYS-225 | Electricity and Magnetism and Electricity and Magnetism Laboratory | 4 |
| | *Credit Hours Subtotal:* | *12* |
| **Mathematics** | | |
| MATH-101 | Calculus I | 4 |
| or MATH-101X | Calculus I | |
| MATH-102 | Calculus II | 4 |
| or MATH-102X | Calculus II | |
| MATH-203 | Multivariate Calculus | 4 |
| or MATH-203X | Multivariate Calculus | |
| MATH-204 | Differential Equations & Laplace Transforms | 4 |
| MATH-305 | Numerical Methods and Matrices | 4 |
| MATH-307 | Matrix Algebra | 4 |
| MATH-308 | Abstract Algebra | 4 |
| MATH-313 | Boundary Value Problems | 4 |
| MATH-321 | Real Analysis I | 4 |
| MATH-327 | Probability & Stochastic Modeling | 4 |
| MATH-412 | Complex Variables | 4 |
| MATH-416 | Vector Analysis | 4 |
| | *Credit Hours Subtotal:* | *48* |
| **Concentration** | | |
| Select one of the following concentrations: | | 28-36 |
| (Courses for each concentration are listed in the Plan of Study Tab) | | |
| Actuarial Science | | |
| Applied and Computational Mathematics | | |
| Applied Statistics | | |
| Mathematical Biology | | |
| | *Credit Hours Subtotal:* | *28-36* |
| **Electives** | | |
| Science Electives | | 8 |
| Free Electives | | 16-24 |
| | *Credit Hours Subtotal:* | *24-32* |
| **Culminating Undergraduate Experience** | | |
| CILE-400 | Culminating Undergraduate Experience: Thesis [2] | 4 |

**(Minimum) Total Credits Required for Program: 161**

[2] Students are automatically registered for CILE-400 in a co-op term when they reach Junior II status.

## Representative Program

| Course | Title | Credit Hours |
|---|---|---|
| **Freshman I** | | |
| CILE-101 | First Year Foundations | 1 |
| CHEM-135 | Principles of Chemistry | 3 |
| CHEM-136 | Principles of Chemistry Lab | 1 |
| COMM-101 | Rhetoric & Writing | 4 |
| MATH-101 | Calculus I | 4 |
| Select one of the following: | | 4 |
| CS-101 | Computing & Algorithms I | |
| IME-211 | Algorithms and Computer Programming | |
| ECE-101 | MATLAB and C Programming | |
| | **Credit Hours** | **17** |

| | | |
|---|---|---|
| **Freshman II** | | |
| ECON-201 | Economic Principles | 4 |
| MATH-102 | Calculus II | 4 |
| MATH-307 | Matrix Algebra | 4 |
| PHYS-114 | Newtonian Mechanics | 3 |
| PHYS-115 | Newtonian Mechanics Laboratory | 1 |
| | **Credit Hours** | **16** |
| **Sophomore I** | | |
| MATH-203 | Multivariate Calculus | 4 |
| MATH-308 | Abstract Algebra | 4 |
| LS-201 | Sophomore Seminar: Exploring the Human Condition | 4 |
| PHYS-224 | Electricity and Magnetism | 3 |
| PHYS-225 | Electricity and Magnetism Laboratory | 1 |
| | **Credit Hours** | **16** |
| **Sophomore II** | | |
| MATH-204 | Differential Equations & Laplace Transforms | 4 |
| MATH-327 | Probability & Stochastic Modeling | 4 |
| Science Elective | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **65** |

## Actuarial Science Concentration

| Course | Title | Credit Hours |
|---|---|---|
| **Junior I** | | |
| MATH-258 | Probability and Statistics | 4 |
| MATH-313 | Boundary Value Problems | 4 |
| MATH-350 | Financial Mathematics | 4 |
| BUSN-221 | Financial Accounting | 4 |
| Advanced Communications Elective | | 4 |
| | **Credit Hours** | **20** |
| **Junior II** | | |
| MATH-305 | Numerical Methods and Matrices | 4 |
| MATH-321 | Real Analysis I | 4 |
| ECON-342 | Intermediate Microeconomics: Managerial Economics | 4 |
| Advanced Humanities Elective | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior I** | | |
| MATH-427 | Statistical Inference & Modeling | 4 |
| MATH-360 | Life Contingencies I | 4 |
| MATH-416 | Vector Analysis | 4 |
| Science Elective | | 4 |
| Advanced Social Science Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior II** | | |
| MATH-361 | Life Contingencies II | 4 |
| MATH-412 | Complex Variables | 4 |
| ECON-344 | Intermediate Macroeconomics: Economic Growth and Fluctuation | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **16** |
| **Senior III** | | |
| MATH-450 | Statistics for Risk Modeling | 4 |
| BUSN-331 | Financial Management | 4 |
| LS-489 | Senior Seminar: Leadership, Ethics, and Contemporary Issues | 4 |
| Advanced Comm, Humanities or Social Science Elective | | 4 |
| | **Credit Hours** | **16** |
| **Any Term** | | |
| CILE-400 | Culminating Undergraduate Experience: Thesis | 4 |
| | **Credit Hours** | **4** |
| | **Total Credit Hours** | **96** |

**(Minimum) Total Credits Required for Program: 161**

## Applied and Computational Mathematics Concentration

| Course | Title | Credit Hours |
|---|---|---|
| **Junior I** | | |
| MATH-305 | Numerical Methods and Matrices | 4 |
| MATH-313 | Boundary Value Problems | 4 |
| Advanced Communications Elective | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **16** |
| **Junior II** | | |
| MATH-328 | Methods of Applied Mathematics | 4 |
| MATH-418 | Intermediate Differential Equations | 4 |
| Advanced Humanities | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **16** |
| **Senior I** | | |
| MATH-416 | Vector Analysis | 4 |
| Engineering Applications/CS Sequence | | 4 |
| Advanced Social Science Elective | | 4 |
| Free Electives | | 8 |
| | **Credit Hours** | **20** |
| **Senior II** | | |
| MATH-321 | Real Analysis I | 4 |
| MATH-423 | Partial Differential Equations | 4 |
| Engineering Applications/CS Sequence | | 4 |
| Science Elective | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior III** | | |
| LS-489 | Senior Seminar: Leadership, Ethics, and Contemporary Issues | 4 |
| MATH-412 | Complex Variables | 4 |
| Engineering Applications/CS Sequence | | 8 |

| | | |
|---|---|---|
| Advanced Comm, Humanities or Social Science Elective | | 4 |
| | **Credit Hours** | **20** |
| **Any Term** | | |
| CILE-400 | Culminating Undergraduate Experience: Thesis | 4 |
| | **Credit Hours** | **4** |
| | **Total Credit Hours** | **96** |

**(Minimum) Total Credits Required for Program: 161**

The student will develop an engineering applications or computer science sequence with the assistance of an academic advisor. The following are examples of a possible CS-sequence, EE-sequence, MECH-sequence, and PHYS sequence.

| Code | Title | Credit Hours |
|---|---|---|
| **CS-Sequence** | | |
| CS-102 | Computing & Algorithms II | 4 |
| CS-203 | Computing & Algorithms III | 4 |
| CS-312 | Theory of Computation | 4 |
| CS-415 | Cryptography | 4 |
| **EE-Sequence** | | |
| EE-210 | Circuits I | 3 |
| EE-240 | Electromagnetic Fields and Applications | 4 |
| EE-340 | Electromagnetic Wave Propagation | 4 |
| EE-348 | Electromagnetic Compatibility | 4 |
| **MECH-Sequence** | | |
| MECH-210 | Statics | 4 |
| MECH-212 | Mechanics of Materials | 4 |
| MECH-310 | Dynamics | 4 |
| MECH-320 | Thermodynamics | 4 |
| **PHYS-Sequence** | | |
| PHYS-302 | Vibration, Sound and Light | 4 |
| PHYS-362 | Modern Physics and Lab | 4 |
| PHYS-412 | Theoretical Mechanics | 4 |
| PHYS-462 | Quantum Mechanics | 4 |

## Applied Statistics Concentration

| Course | Title | Credit Hours |
|---|---|---|
| **Junior I** | | |
| MATH-258 | Probability and Statistics | 4 |
| MATH-313 | Boundary Value Problems | 4 |
| MATH-412 | Complex Variables | 4 |
| Advanced Communications Elective | | 4 |
| | **Credit Hours** | **16** |
| **Junior II** | | |
| MATH-305 | Numerical Methods and Matrices | 4 |
| MATH-450 | Statistics for Risk Modeling | 4 |
| Industrial/MATH Elective [1] | | 4 |
| Free Elective | | 4 |
| Advanced Humanities Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior I** | | |
| MATH-350 | Financial Mathematics | 4 |
| MATH-416 | Vector Analysis | 4 |
| MATH-427 | Statistical Inference & Modeling | 4 |
| Free Elective | | 4 |
| Advanced Social Science Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior II** | | |
| IME-471 | Quality Control | 4 |
| IME-473 | Design of Experiments | 4 |
| MATH-321 | Real Analysis I | 4 |
| Free Elective | | 4 |
| Science Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior III** | | |
| LS-489 | Senior Seminar: Leadership, Ethics, and Contemporary Issues | 4 |
| Industrial/Math Elective [1] | | 4 |
| Advanced Comm, Humanities or Advanced Social Science Elective | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **16** |
| **Any Term** | | |
| CILE-400 | Culminating Undergraduate Experience: Thesis | 4 |
| | **Credit Hours** | **4** |
| | **Total Credit Hours** | **96** |

**(Minimum) Total Credits Required for Program: 161**

[1] The student should select at least two IME/MATH electives from the following courses: IME-321, IME-422, MATH-428.

## Mathematical Biology Concentration

| Course | Title | Credit Hours |
|---|---|---|
| **Junior I** | | |
| MATH-313 | Boundary Value Problems | 4 |
| Advanced Chemistry Elective | | 4 |
| Advanced Communications Elective | | 4 |
| Advanced Humanities Elective | | 4 |
| | **Credit Hours** | **16** |
| **Junior II** | | |
| MATH-328 | Methods of Applied Mathematics | 4 |
| MATH-418 | Intermediate Differential Equations | 4 |
| BIOL-241 | Human Biology | 3 |
| BIOL-242 | Human Biology Lab | 1 |
| Advanced Social Science Elective | | 4 |
| Free Elective | | 4 |
| | **Credit Hours** | **20** |

| | | |
|---|---|---|
| **Senior I** | | |
| MATH-258 | Probability and Statistics | 4 |
| MATH-416 | Vector Analysis | 4 |
| BIOL-341 | Anatomy and Physiology | 4 |
| Science Elective | | 4 |
| Advanced Comm, Humanities or Advanced Social Science Elective | | 4 |
| | **Credit Hours** | **20** |
| **Senior II** | | |
| MATH-321 | Real Analysis I | 4 |
| MATH-330 | Biostatistics | 4 |
| BIOL-381 | Molecular Biology | 4 |
| BIOL-382 | Molecular Biology Lab | 3 |
| Free Elective | | 4 |
| | **Credit Hours** | **19** |
| **Senior III** | | |
| BIOL-351 | Genetics | 4 |
| LS-489 | Senior Seminar: Leadership, Ethics, and Contemporary Issues | 4 |
| MATH-412 | Complex Variables | 4 |
| Free Electives | | 8 |
| | **Credit Hours** | **20** |
| **Any Term** | | |
| CILE-400 | Culminating Undergraduate Experience: Thesis | 4 |
| | **Credit Hours** | **4** |
| | **Total Credit Hours** | **99** |

**(Minimum) Total Credits Required for Program: 161**