

# ENGINEERING MATHEMATICS

## (Concurrent Degree)

The Bachelor of Science Engineering in Engineering Mathematics program at UM-Dearborn provides students an opportunity to expand their knowledge in the field of applied mathematics, which is essential in modern engineering. By combining the tools and techniques learned in the engineering mathematics program with those learned in their engineering disciplines, students become more proficient in the application of mathematical reasoning to formulate and solve a wide range of contemporary engineering problems. The combined mathematics and engineering education gained through the program enables the graduates to successfully pursue professional careers in industry, research and development, and elsewhere.

The Engineering Mathematics degree is a concurrent Bachelor of Science in Engineering (B.S.E.) degree in Engineering Mathematics (EMATH) that can be pursued by undergraduate students majoring in Bioengineering, Computer Engineering, Electrical Engineering, Industrial and Systems Engineering, Manufacturing Engineering, Mechanical Engineering, or Robotics Engineering. This makes it possible for a student majoring in one of the engineering disciplines to earn two degrees at the same time: a Bachelor of Science Engineering degree in their principal engineering major and a concurrent Bachelor of Science Engineering degree in Engineering Mathematics. *Both degrees must be earned at the same time.*

## Educational Objectives

The coursework in the concurrent Bachelor of Science Engineering in Engineering Mathematics prepares graduates to:

1. Be able to develop innovative mathematical solutions to complex engineering problems.
2. Engage in continuous learning to advance their professional careers.

## Student Outcomes

1. The ability to apply mathematical tools to model and solve engineering/applied mathematics problems
2. The ability to use techniques and modern mathematical tools to solve engineering/applied mathematics problems.
3. The ability to communicate mathematical ideas.

## Dearborn Discovery Core (General Education)

All students must satisfy the University's Dearborn Discovery Core requirements ([https://catalog.umd.umich.edu/undergraduate/gen\\_ed\\_ddc/](https://catalog.umd.umich.edu/undergraduate/gen_ed_ddc/)), in addition to the requirements for the major

## Major Requirements

The Engineering Mathematics degree requires a minimum of 15 credit hours of course work in advanced mathematics beyond the 16 credits of mathematics already required in the degree program of the student's principal engineering major.

Code	Title	Credit Hours
MATH 462	Mathematical Modeling	3
<b>Choose 12 credits from the following (at least 9 credits must be MATH):</b>		<b>12</b>

MATH 300	Math Lang Proof & Struct	
MATH 335	Mathematical Interest Theory	
MATH 390	Topics in Mathematics (Prior Approval by your advisor needed for use in EMATH degree)	
MATH 395	Elementary Number Theory	
MATH 396	Introduction to Cryptography	
MATH 4000	Capstone in Mathematics	
MATH 404	Dynamical Systems	
MATH 412	Introduction to Modern Algebra	
MATH 420/ ECE 555	Stochastic Processes <sup>1</sup>	
MATH 423	Applied Linear Algebra	
MATH 425	Statistical Inference	
MATH 435	Mathematics of Finance	
MATH 451	Advanced Calculus	
MATH 454	Fourier Series and Boundary Value Problems	
MATH 455	Functions of a Complex Variable with Applications	
MATH 472	Introduction to Computational Mathematics	
MATH 492	Introduction to Topology	
Take at most one course from the following:		0-4
ECE 3100	Data Science I	
CIS 3200	Data Science II	
ECE 567	Nonlinear Control Systems <sup>1</sup>	
ECE 3171	Analog & Discrete Sig & Sys	
ECE 329	Intro to Computer Music	
ECE 347	Applied Dynamics	
ECE 434	Introduction to Machine Learning	
ECE 452	Probabilistic Meth/Signal Alys	
ECE 460	Automatic Control Systems	
IMSE 505	Optimization <sup>1</sup>	
IMSE 511	Design and Analysis of Exp <sup>1</sup>	
ME 410	Finite Element Methods with Application	
ME 4301	Computational Thermo-Fluids	
ME 564	Linear Systems Control <sup>1</sup>	
ME 518	Advanced Engineering Analysis <sup>1</sup>	

<sup>1</sup> Permission of graduate instructor required. Graduate tuition assessment applies.

## Learning Goals

1. Be able to develop innovative mathematical solutions to complex engineering problems.
2. Engage in continuous learning to advance their professional careers.