

BIOENGINEERING/ MECHANICAL ENGINEERING

Students with an interest in both areas can pursue a dual BSE program in Bioengineering and Mechanical Engineering and thus can earn two BSE degrees at the same time:

- BSE degree in Bioengineering
- BSE degree in Mechanical Engineering

The dual degree program requires specified coursework that equals a minimum of 143 total credits.

Dual Bioengineering/Mechanical Engineering Accelerated Master Option

The accelerated undergraduate/master's studies option allows current students enrolled in the BENG/ME undergraduate dual degree program at UM-Dearborn to complete the ME and BENG BSE degrees and the MSE bioengineering degree in an accelerated format. This is achieved via combining a portion of undergraduate and graduate coursework. Admitted students can double-count up to 9 credits of 500-level or above bioengineering elective, core, or cognate courses taken during their junior or senior years. Of these, only one cognate course is allowed.

In practice with the usual graduate student program rules, these students may also transfer a maximum of 6 additional 500 level credits toward the 30-credit master's degree. These additional transfer credits can be taken during the junior and senior years and cannot be used for any portion of the undergraduate degree. Depending on the number of double-counted and transfer credits, 15-21 credits of graduate coursework would be needed to complete the master's program after completion of the undergraduate degree.

Please see the (<https://umdearborn.edu/cecs/departments/mechanical-engineering/undergraduate-programs/41-bioengineering-program/>)Dual Bioengineering/Mechanical Engineering Accelerated Master Option (<https://umdearborn.edu/cecs/departments/mechanical-engineering/undergraduate-programs/beme-dual-accelerated-masters-program/>)webpage for more information.

Dearborn Discovery Core

Please see the Dearborn Discovery Core (General Education) (<https://umdearborn.edu/dearborn-discovery-core/>) webpage or additional information.

Foundational Studies

Writing and Communication (GEWO) – 6 Credits

Upper-Level Writing Intensive (GEWI) – 3 Credits

Quantitative Thinking and Problem Solving (GEQT) – 3 Credits

Critical and Creative Thinking (GECC) – 3 Credits

Areas of Inquiry

Natural Science (GENS) – 7 Credits

- Lecture/Lab Science Course
- Additional Science Course

Social and Behavioral Analysis (GESB) – 9 Credits

Humanities and the Arts (GEHA) – 6 Credits

Intersections (GEIN) – 6 Credits

Capstone

Capstone (GECE) – 3 Credits

Major Requirements

A candidate for the Dual BSE in Bioengineering and Mechanical Engineering is required to pursue scholastic quality and to complete satisfactorily the following program of study:

Prerequisite Courses

Code	Title	Credit Hours
COMP 270	Tech Writing for Engineers (Also fulfills 3 credits of DDC Written and Oral Communication)	3
ECON 201 or ECON 202	Prin: Macroeconomics (Also fulfills 3 credits of DDC Social and Behavioral Analysis) Prin: Microeconomics	3
MATH 115	Calculus I	4
MATH 116	Calculus II	4
MATH 215	Calculus III	4
MATH 228	Diff Eqns with Linear Algebra	4
CHEM 134	General Chemistry IA	4
CHEM 136	General Chemistry IIA	4
BENG 200	Anatomy and Physiology for Engineers	4
BIOL 140	Intro Molec & Cellular Biology	4
PHYS 150	General Physics I	4
PHYS 151	General Physics II	4
ENGR 100	Introduction to Engineering and Engineering Design	3
ENGR 126	Engineering Computer Graphics	2
ENGR 216	Computer Meth for Engineers	2
ENGR 250	Principles of Eng Materials	3
ME 230	Thermodynamics	4
ME 260	Design Stress Analyses	4

Dual Major in BENG/ME Courses

Code	Title	Credit Hours
BENG/ME Core		
ECE 305	Intro to Electrical Eng	4
ME 325	Thermal Fluid Sciences I	4
ME 345	Engineering Dynamics	4
BENG 351	Bio-Sensors & Instrumentation	4
BENG 364	Prob&Stat in Bioengineering	3
BENG 370	Biomechanics I	4
BENG 375	Biomaterial Tissue Engrg	4
BENG 381	Bioprocessing	4
ME 375	Thermal Fluid Sciences II	4
ME 379	Thermal-Fluids Laboratory	3
ME 381	Manufacturing Processes I	4
ME 3601	Design and Analysis of Machine Elements	4

ME 442	Control Systems Analysis and Design	4
ME 4681	ME/BENG Dual Senior Design	4
Program Electives		10
Select 10 credits of upper-level elective courses from the lists below. 10		
At least one course must be a design elective (3-4 credits). At least 6 credits (2 courses) must be from ME or BENG courses. Interested students may select elective courses focusing on bioengineering or mechanical engineering or by following one of these recommended mechanical engineering tracks: engineering mechanics, engineering design, energy and sustainability, materials and manufacturing, mechatronics and robotics, and vehicles and mobility. Undergraduate certificate credentials can be declared for each track. The courses suggested for each track can be found on the program's website. ¹		
Upper-Level Design Electives		3-4
select at least one course from this area		
BENG 426	Fundamentals of Drug Delivery	3
BENG 451	Microfluidics	3
BENG 450	Biophotonics and Optical Metrology	3
BENG 460	Nanobiosystems Engineering	3
BENG 470	Advanced Biomechanics	3
BENG 481	Biomimetics	3
BENG 490	Directed Design Project	1-3
or ME 490	Directed Design Project	
ENGR 360	Design Thinking : Process, Method & Practice	4
ENGR 493	Exper Hnrs Dir Dsgn	1
ME 4191	Structural Mech & Design	4
ME 4202	Design Turbo. and Wind Gen.	4
ME 423	Thermal Sys Des & Optimization	4
ME 4361	Design of HVAC Systems	4
ME 440	Intro to Mechanical Vibrations	3
ME 445	Sound and Noise Controls	4
ME 4461	Mech Vibration & Noise Control	4
ME 4471	Solar Energy Sys Analy&Design	4
ME 4500	Design of Automotive Chassis and Body Systems	3
ME 452	Sustainable Energy & Environment	4
ME 460	Design for Manufacturing	3
ME 469	Senior Design II	1-4
ME 472	Prin & Appl of Mechatronic Sys	4
ME 483	Dsgn Cons in Poly and Comp Mat	3
ME 493	Advanced Vehicle Energy Sys	3
Upper-Level Technical Electives		6-8
BCHM 370	Principles of Biochemistry	3
BENG 410	Bioinformatics	3
BENG 425	Transport in Biosystems	3
BENG 475	Regenerative Engineering	3
BENG 492	Guided Study in Bioengineering	1-3
or ME 492	Guided Study in Mechanical Engineering	
CHEM 225	Organic Chemistry I	3
CHEM 226	Organic Chemistry II	3
CHEM 227	Organic Chemistry Laboratory	2
CHEM 437	Nano-Biotechnology	3
ENGR 350	Nanoscience and Nanotechnology	4
ENGR 399	Experiential Honors Prof. Prac	1
ENGR 492	Exper Honors Directed Research	1

ENT 400	Entrepreneurial Thinking&Behav	3
IMSE 381	Industrial Robots	4
IMSE 440	Applied stat models in engin	3
IMSE 4425	Human Factors and Ergonomics	4
IMSE 4675	Six Sigma & Stat Proc Improv	4
ME 410	Finite Element Method wth Appl	3
ME 4301	Computational Thermo-Fluids	3
ME 4640	Linear Systems Control	3
ME 481	Manufacturing Processes II	3
ME 4910	Degradation of Materials	3
ME 491	Directed Research Problems	1-3
ME 4950	Digital Manufacturing and Product Innovation	3
ME 496	Internal Combustion Engines I	3
ME 4981	Automotive Engineering	4

Students admitted to the Dual Bioengineering/Mechanical Engineering Accelerated Master Option can double-count up to 9 credits of 500-level or above bioengineering elective, core, or cognate courses taken during their junior or senior years.

¹ The courses suggested for each track can be found on the program website (<https://umdearborn.edu/cecs/departments/mechanical-engineering/undergraduate-programs/bse-mechanical-engineering/>).