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.

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/), in addition to the requirements for the major

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	Prin: Macroeconomics (Also fulfills 3 credits of DDC Social and Behavorial Analysis)	3
or ECON 202	Prin: Microeconomics	
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 134L	General Chemistry IA Laboratory	0
CHEM 136	General Chemistry IIA	4
CHEM 136L	General Chem IIA Laboratory	0
BENG 200	Anatomy and Physiology for Engineers	4
BIOL 140	Intro Molec & Cellular Biology	4
PHYS 150	General Physics I	3
PHYS 150L	General Physics I Lab/Dis	1
PHYS 151	General Physics II	3
PHYS 151L	General Physics II Lab/Dis	1
ENGR 100	Introduction to Engineering and Engineering Design	3
ENGR 100L	Introduction to Engineering and Engineering Design Lab	0
ENGR 126	Engineering Computer Graphics	2
ENGR 126L	Engin Computer Graphics Lab	0
ENGR 200	Modern Computer Programming for Engineers	4
ENGR 200L	Modern Computer Programming for Engineers Lab	0
ENGR 250	Principles of Engineering Materials	3
ENGR 250R	Prin of Eng Materials Rec	0
ME 230	Thermodynamics	4
ME 230R	Thermodynamics	0
ME 260	Design Stress Analyses	4
ME 260R	Design Stress Analysis	0

Dual Major in BENG/ME Courses

Code	Title	Credit Hours
BENG/ME Core		
ECE 305	Intro to Electrical Eng	4
ECE 305L	Intro to Electrical Eng Lab	0
BENG 300	Codes, Standards, and Regulations in Biomedical Engineering	1
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
or ME 381	Manufacturing Processes I	
ME 381L	Manufacturing Procceses I Lab	0
ME 320	Fluid Mechanics	4
ME 320L	Fluid Mechanics Lab	0
ME 345	Engineering Dynamics	4
ME 355	Modeling and Analysis of Dynamic Systems	4
ME 355L	Modeling and Analysis of Dynamic Systems Lab	0
ME 371	Heat Transfer	4
ME 371L	Heat Transfer Lab	0
ME 3601	Design and Analysis of Machine Elements	4
ME 442	Control Systems Analysis and Design	4
ME 442L	Contrl Sys Anlys and Desgn Lab	0
ME 4681	ME/BENG Dual Senior Design	4
Program Electives		**10**
Select 10 credits of upper-level elective courses from the lists below. 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]		10
Upper-Level Design Electives		**3-4**
select at least one course from this area		
BENG 381	Bioprocessing	4
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 480	Mechanotransduction	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 381	Manufacturing Processes I	4
ME 4191	Structural Mech & Design	4
ME 4202	Design of Turbomachinery and Wind Generation	4
ME 423	Thermal Systems Design & 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 Systems	3
Upper-Level Technical Electives		**6-8**
BCHM 370	Principles of Biochemistry	4
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	4
CHEM 226	Organic Chemistry II	4
CHEM 227	Organic Chemistry Laboratory	2
CHEM 437	Nano-Biotechnology	4
ENGR 299	Experiential Learning in Engineering & Computer Science 1	1
ENGR 345	Effective Use of AI Tools for Scientists and Engineers	3
ENGR 350	Nanoscience and Nanotechnology	4
ENGR 399	Experiential Learning in Engineering & Computer Science 2	1
ENGR 492	Exper Honors Directed Research	1
ENGR 499	Experiential Learning in Engineering & Computer Science 3	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 Methods with Application	3
ME 4301	Computational Thermo-Fluids	3
ME 4550	Computational Uncertainty Quantification for Engineering Applications	3
ME 4640	Linear Systems Control	3
ME 4790	Aerodynamics of Road Vehicles	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

[1] The courses suggested for each track can be found on the Mechanical Engineering department website (https://umdearborn.edu/cecs/departments/mechanical-engineering/undergraduate-programs/program-tracks-and-undergraduate/).