BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING 4+1 GRADUATE TRACK

Mechanical engineering is the branch of the engineering profession that is concerned with harnessing the power of machines to accomplish tasks and goals faster, safer, and more efficiently. Within the broad field of mechanical engineering, this can vary greatly in complexity and magnitude, from athletic equipment for enhancing performance to household items for living comfort to cars that get us where we're going to medical devices that keep us healthy.

The challenge of mechanical engineering is to weave together fundamental knowledge of not just mathematics, physics and chemistry, but also fluid and thermal sciences, kinetics and dynamics in order to approach problem solving creatively and design real-world solutions. Our curriculum prepares students for a wide variety of technical and professional careers areas that have their roots in mechanical engineering: aerospace, power generation, transportation, biotechnology, manufacturing, product design, robotics and controls, and many more.

COURSE	TITLE	S.H.
FIRST YEAR REQUIREMENT - STUDENT SUCCES		
YSU 1500	Success Seminar	1-2
or YSU 1500S	Youngstown State University Success Seminar	
or HONR 1500	Intro to Honors	
General Education Requirements		
ENGL 1550	Writing 1	3-4
or ENGL 1549	Writing 1 with Support	
ENGL 1551	Writing 2	3
Mathematics requirement (met with MATH in major)		
Arts and Humanities (2 courses)		
PHIL 2625	Introduction to Professional Ethics	3
Arts and Humanities elective		3
Social Sciences (2 courses)		
ECON 2610	Principles 1: Microeconomics	3
Social Science elective		3
Natural Sciences (2 courses, 1 with lab) (6-7 s.h.)		
Met with two of the following required courses: CHEM 1515, PHYS 2610, and one lab: PHYS 2610L or CHEM 1515L		
General Education Elective (9 s.h.)		
CMST 1545	Communication Foundations	3
Select 2 General Education Courses		6
Mechanical Engineering Courses		
MECH 1560	Engineering Communication with CAD	2
MECH 2603	Thermodynamics 1	3
MECH 3704	Thermodynamics 2	3
MECH 2606	Engineering Materials	3
MECH 2641	Dynamics	3
MECH 3708	Dynamic Systems Modeling	3
MECH 3720 & 3720L	Fluid Dynamics and Fluid Dynamics Laboratory	4
MECH 3725	Heat Transfer 1	3
MECH 3742	Kinematics of Machines	3
MECH 3751 & 3751L	Stress and Strain Analysis 1 and Stress and Strain Analysis 1 Laboratory	4
MECH 3762 & 3762L	Design of Machine Elements and Design of Machine Elements Laboratory	4
MECH 4808 & 4808L	Mechanical Systems Design 1 and Mechanical Systems Design Laboratory	3
MECH 4809 & 4809L	Mechanical Systems Design 2 and Mechanical Systems Design Laboratory 2	4
MECH 4825L	Heat Transfer and Thermodynamics Laboratory	1
MECH 5881 & 5881L	Mechanical Vibrations and Mechanical Vibrations Laboratory	4
Other Engineering Courses		
ENGR 1500	Engineering Orientation	1
ENGR 1550	Engineering Concepts	2
ENGR 1560	Engineering Computing	2
CEEN 2601	Statics	3
CEEN 2602 & 2602L	Strength of Materials and Strength of Materials Lab	4
ECEN 2614	Basics of Electrical Engineering	3
STAT 3743	Probability and Statistics	4
MECH Dual Credit Hours **Select 3 of these courses, as only 3 can be double counted. Can select a 4th that would be only count for the Master's degree.**		**9**
MECH 5825	Heat Transfer 2	
MECH 5836	Fluid Power and Control	
MECH 5842	Kinetics of Machines	
MECH 5852	Stress and Strain Analysis 2	
MECH 5884	Finite Element Analysis	
MECH 5885	Computational Fluid Dynamics	
MECH 5892	Control of Mechanical Systems	
MTEN 5868	Failure Analysis Using the SEM	
MECH 6900	Special Topics	
MECH 6900I	ST Engineering Tribology	
MECH 6904	Advanced Thermodynamics	
MECH 6915	Failure Analysis	
MECH 6925	Computational Heat Transfer	
MECH 6930	Advanced Fluid Mechanics and Heat Transfer	
MECH 6945	Advanced Dynamics	
Mathematics courses		
MATH 1571	Calculus 1	4
MATH 1572	Calculus 2	4
MATH 2673	Calculus 3	4
MATH 3705	Differential Equations	3
Chemistry and Physics courses		
CHEM 1515 & 1515L	General Chemistry 1 and General Chemistry 1 Laboratory	4
PHYS 2610 & 2610L	General Physics 1 and General Physics Laboratory 1	5
PHYS 2611	General Physics 2	4
Total Semester Hours		**131-133**

Dual Credit Requirements

Accelerated 4+1 Program

Undergraduate Mechanical Engineering students can apply for admission into the accelerated 4+1 MSE in Mechanical Engineering graduate program after completing 78 undergraduate semester hours with a GPA of 3.3 or higher. After being admitted to the accelerated 4+1 MSE program, students will be allowed a maximum of nine semester hours of graduate coursework, specified as 5000 level or higher, to be double counted toward both a Bachelor's and Master's degrees. The courses chosen to count for both undergraduate and graduate coursework must be approved by the Graduate Program Director. An additional three hours of graduate coursework can be completed as an undergraduate

and used exclusively for graduate credit. This allows the student to graduate with a Master's degree with one year of additional full-time study beyond the bachelor's degree, as the total hours counted towards the Master's degree is greater than or equal to 30 hours.

Year 1		
Fall		**S.H.**
YSU 1500 or YSU 1500S or HONR 1500	Success Seminar or Youngstown State University Success Seminar or Intro to Honors	1-2
ENGL 1550	Writing 1	3
CHEM 1515 & 1515L	General Chemistry 1 and General Chemistry 1 Laboratory	4
MATH 1571	Calculus 1	4
ENGR 1500	Engineering Orientation	1
ENGR 1550	Engineering Concepts	2
GER Elective		3
	Semester Hours	**18-19**
Spring		
ENGL 1551	Writing 2	3
MATH 1572	Calculus 2	4
PHYS 2610 & 2610L	General Physics 1 and General Physics Laboratory 1	5
CMST 1545	Communication Foundations	3
ENGR 1560	Engineering Computing	2
	Semester Hours	**17**
Year 2		
Fall		
MECH 1560	Engineering Communication with CAD	2
MECH 2606	Engineering Materials	3
MATH 2673	Calculus 3	4
PHYS 2611	General Physics 2	4
CEEN 2601	Statics	3
	Semester Hours	**16**
Spring		
MECH 2641	Dynamics	3
MECH 2603	Thermodynamics 1	3
MATH 3705	Differential Equations	3
CEEN 2602 & 2602L	Strength of Materials and Strength of Materials Lab	4
ECEN 2614	Basics of Electrical Engineering	3
	Semester Hours	**16**
Year 3		
Fall		
MECH 3704	Thermodynamics 2	3
MECH 3720 & 3720L	Fluid Dynamics and Fluid Dynamics Laboratory	4
MECH 3742	Kinematics of Machines	3
MECH 3751	Stress and Strain Analysis 1	3
MECH 3751L	Stress and Strain Analysis 1 Laboratory	1
ECON 2610	Principles 1: Microeconomics	3
	Semester Hours	**17**
Spring		
MECH 3708	Dynamic Systems Modeling	3
MECH 3725	Heat Transfer 1	3
MECH 3762 & 3762L	Design of Machine Elements and Design of Machine Elements Laboratory	4
ISEN 2610 or STAT 3743	Engineering Statistics or Probability and Statistics	3-4
	Semester Hours	**13-14**
Year 4		
Fall		
MECH 4808	Mechanical Systems Design 1	2
MECH 4808L	Mechanical Systems Design Laboratory	1
MECH 4825L	Heat Transfer and Thermodynamics Laboratory	1
MECH 5881 & 5881L	Mechanical Vibrations and Mechanical Vibrations Laboratory	4
PHIL 2625	Introduction to Professional Ethics	3
MECH Dual Credit		3
GER Elective (SS)		3
	Semester Hours	**17**
Spring		
MECH 4809	Mechanical Systems Design 2	3
MECH 4809L	Mechanical Systems Design Laboratory 2	1
MECH Dual Credit		3
MECH 5881L	Mechanical Vibrations Laboratory	1
MECH Dual Credit		3
GER Elective (AH)		3
GER Elective		3
	Semester Hours	**17**
	Total Semester Hours	**131-133**

Mechanical Engineering Dual Credit Courses

Select 3 courses from the following:

Can select 3 from this list, over the 5000 level, to double count towards Bachelor's and Master's, after acceptance into the MSE program. Can select a 4th that counts only towards Master's Degree.

COURSE	TITLE	S.H.
Mechanical Engineering Electives		
Heat & Fluid Flow		
MECH 4800	Special Topics	3
MECH 4823	Heating, Ventilation, and Air Conditioning	3
MECH 4835	Thermal Fluid Applications	3
MECH 5825	Heat Transfer 2	3
MECH 5836	Fluid Power and Control	3
MECH 5885	Computational Fluid Dynamics	4
Solid Mechanics		
MECH 4800 Special Topics		3
MECH 5842	Kinetics of Machines	3
MECH 5852	Stress and Strain Analysis 2	3
MECH 5884	Finite Element Analysis	3
MECH 5892	Control of Mechanical Systems	3
MTEN 5868 Failure Analysis Using the SEM		3
6000 level courses		
MECH 6900	Special Topics	2-4
MECH 6900I	ST Engineering Tribology	2-4
MECH 6904	Advanced Thermodynamics	3
MECH 6915	Failure Analysis	3

MECH 6925	Computational Heat Transfer	3
MECH 6930	Advanced Fluid Mechanics and Heat Transfer	3
MECH 6945	Advanced Dynamics	3

The YSU mechanical engineering program student outcomes ensure that our graduates have been given the skills to attain the program educational objectives after graduation. Student outcomes for direct assessment are ABET specified outcomes (1) through (7). Our students are expected to graduate with:

1. Engineering Expertise - an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

2. Design Expertise - an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

3. Communication Skills - an ability to communicate effectively with a range of audiences

4. Professional Responsibility - an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

5. Teamwork Competency - an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

6. Experimental Competency - an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

7. Life-long Learning - an ability to acquire and apply new knowledge as needed, using appropriate learning strategies