Mechanical Engineering

Mechanical Engineering Major

The Mechanical Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (www.abet.org (http://www.abet.org)). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies.

Mission

The Department of Mechanical Engineering at NDSU will contribute to the aspirations of a land-grant university in the three primary components of education, research, and service. In support of these endeavors the mission of the department is to:

- Educate undergraduate and graduate students in the fundamentals of the discipline, prepare graduates to effectively function in society in the field of their choice, and provide the learning skills to adapt to evolving personal and professional goals.
- Develop and maintain high quality research programs in traditional and emerging areas that build on the diverse strengths of the faculty, foster interdisciplinary collaborations, and address national and global needs.
- Serve the needs of the profession, the state of North Dakota, and regional industries to promote and enhance economic development opportunities.

Educational Objectives

Within a few years of graduation, alumni of the mechanical engineering program at NDSU are expected to have:

1. Maintained an ability and willingness to adapt to emerging technologies through continued professional development
2. Provided contributions to the engineering profession in the field of their choice
3. Demonstrated a commitment to uphold high ethical and professional standards in the practice of engineering
4. Exhibited their ability to function in a team environment and interact with people of diverse backgrounds
5. Shown a commitment to be engaged and conscientious practitioners who understand the context in which their designs are implemented and the corresponding impact of their activities on society

A complete listing of the student outcomes associated with these objectives can be viewed on the department's web site (http://www.ndsu.edu/me) .

Strong program emphasis is placed on engineering science, laboratory, and design. The use of modern computer tools and techniques in engineering practice also is incorporated throughout the curriculum. In addition, liberal arts education is included to prepare graduates for becoming concerned and productive members of society.

Students transferring into mechanical engineering from other departments or institutions are encouraged to do so no later than the beginning of the junior year if they wish to complete the degree requirements within two academic years.

Graduate programs leading to Master of Science and Doctor of Philosophy degrees in Mechanical Engineering are offered by the department. For more complete details, see the Graduate Bulletin (http://bulletin.ndsu.edu/past-bulletin-archive/2014-15/graduate) online.

Selective Admission

The Department of Mechanical Engineering has a selective admission policy. To be admitted to the basic program (freshman and sophomore level), freshman applicants must either rank in the top one-third of their high school graduating class or have received a score of 26 or higher in the math portion of the ACT. Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average (GPA) of at least 2.80.

To enter the professional program (junior and senior level), students must complete the basic program with an Engineering GPA of 2.80 and no grade below 'C' in any one of the core courses.

A minimum institutional GPA of 2.50 is required for graduation from Mechanical Engineering. No course grades less than 'C' are acceptable to fulfill a program requirement.

Curriculum

All Mechanical Engineering majors choose a minimum of five technical elective courses. These courses cover a wide range of topics and students may tailor their choices to reflect their special interests in solid mechanics and design, thermal sciences, materials and nanotechnology, injection molding, biomechanical engineering, or other areas as added in the future. For a complete list of technical electives available in each area, students should consult with their adviser, the department, or the curriculum guide.

Major Requirements

Major: Mechanical Engineering

Degree Type: B.S.M.E.
Required Degree Credits to Graduate: 130

General Education Requirements

First Year Experience (F):		
UNIV/ME 189	Skills For Academic Success	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
CHEM 121	General Chemistry I	3
CHEM 122	General Chemistry II	3
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
Humanities & Fine Arts (A): Select from the current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from the current general education list		2

Cultural Diversity (D): Select from the current general education list		
Global Perspectives (G): Select from the current general education list		
Total Credits		42
General Education Requirements		40
Mechanical Engineering Requirements:		
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 213	Modeling of Engineering Systems	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
ME 351	Thermodynamics I	3
ME 352	Fluid Dynamics	3
ME 361	Introduction to Mechanical Engineering Profession	1
ME 412	Engineering Measurements	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 443	Machine Design II	3
ME 454	Heat and Mass Transfer	3
ME 457	Thermal Systems Laboratory	3
ME 461	Design Project I	3
ME 462	Design Project II	3
MATH Courses Required:		
MATH 129	Basic Linear Algebra	2
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Other Required Courses:		
ECE 301	Electrical Engineering I	3
ECE 303	Electrical Engineering II	3
ECE 306	Electrical Engineering Lab I	1
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 330	Manufacturing Processes	3
Technical Electives: Select 15 credits from the following:		15
ME 332	Engineering Materials II	
ME 341	Mechanics of Machinery	
ME 353	Thermodynamics II	
ME 415	Emerging Technologies in Mechanical Engineering	
ME 423	Intermediate Mechanics of Materials	
ME 433	Composite Materials Science and Engineering	
ME 435	Plastics and Injection Molding Manufacturing	
ME 437	Engineering Ceramics	
ME 468	Introduction to Biomechanics	
ME 470	Renewable Energy Technology	
ME 471	Experimental Stress Analysis	
ME 472	Fatigue and Fracture of Metals	
ME 473	Engineering with Polymeric Materials	
ME 474	Mechanics of Composite Materials	
ME 475	Automatic Controls	
ME 476	Mechatronics	
ME 477	ME Finite Element Analysis	
ME 480	Biofluid Mechanics	
ME 481	Fundmentals of Energy Conversion	
ME 482	Fuel Cell Science and Engineering	
ME 483	Introduction to Computational Fluid Dynamics	
ME 484	Gas Turbines	
ME 485	Heating, Ventilation and Air Conditioning	
ME 486	Nanotechnology and Nanomaterials	
ME 487	Internal Combustion Engines	
ME 488	Introduction to Aerodynamics	
ME 489	Vehicle Dynamics	
Approved technical electives from other departments - no more than two courses from the following:		
ABEN 456	Biobased Energy	
CPM 473	Polymer Synthesis	
CPM 474	Coatings I	
CPM 475	Coatings II	
CPM 486	Corrosion and Materials	
ECE 487	Cardiovascular Engineering	
IME 430	Process Engineering	
IME 431	Production Engineering	
IME 432	Composite Materials Manufacturing	
IME 440	Engineering Economy	
IME 460	Evaluation of Engineering Data	
PHYS 350	Modern Physics	
PHYS 361	Electromagnetic Theory	
PHYS 485	Quantum Mechanics I	
Courses cross-listed with other departments:		
ME 435/IME 635	Plastics and Injection Molding Manufacturing	
ME/ABEN 479	Fluid Power Systems Design	
ME 486/CE 686	Nanotechnology and Nanomaterials	
Total Credits		130

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- No grades less than 'C' will be accepted to fulfill a course requirement.
- No more than six credits of approved technical electives may be taken outside the ME department.
- Admission to the Mechanical Engineering Professional program requires a 2.80 Engineering GPA.
- A 2.50 cumulative GPA is required for graduation requirements.

				Freshman
Fall	**Credits**	**Spring**	**Credits**	
MATH 165	4	MATH 166	4	
ENGL 110	3	ENGL 120	3	
CHEM 121	3	CHEM 122	3	

ME 189		1	ME 212	3
Humanities Elective (Select from approved gen ed list)		3	ME 221	3
Social Sci. Elective (Select from approved gen ed list)		3	Wellness (Select from approved gen ed list)	2
		17		**18**
				Sophomore
Fall	**Credits**		**Spring**	**Credits**
MATH 129		2	MATH 266	3
MATH 259		3	COMM 110	3
IME 330		3	PHYS 252	4
ME 222		3	PHYS 252L	1
ME 223		3	ME 213	3
Humanities Elective (Select from approved gen ed list)		3	ME 351	3
		17		**17**
				Junior
Fall	**Credits**		**Spring**	**Credits**
ECE 301		3	ECE 303	3
ENGL 321		3	ECE 306	1
ME 331		4	ENGR 402	1
ME 352		3	ME 361	1
Technical Elective (Select from approved list)		3	ME 442	3
			ME 454	3
			Technical Elective (Select from approved list)	3
		16		**15**
				Senior
Fall	**Credits**		**Spring**	**Credits**
ME 421		3	ME 412	3
ME 443		3	ME 462	3
ME 457		3	Technical Elective (Select from approved list)	3
ME 461		3	Technical Elective (Select from approved list)	3
Technical Elective (Select from approved list)		3	Social Sci. Elective (Select from approved gen ed list)	3
		15		**15**

Total Credits: 130