

Bachelor of Science in Mechanical Engineering

Required 128 credits (36 of which must be numbered 300 or above) including:

I. Essential Studies Requirements (see University ES listing).

II. Mechanical Engineering required courses*:

Code	Title	Credits
ME 101	Introduction to Mechanical Engineering ^{1,2}	3
ME 201	Student Design ^{1,2}	2
or ME 201C & ME 201L	Student Design Lecture and Student Design Lab	
ME 301	Materials Science	3
ME 306	Fluid Mechanics	3
ME 323 & 323L	Machine Component Design and Machine Component Design Laboratory	4
ME 324	Control Systems	3
ME 341	Thermodynamics ¹	3
ME 418 & 418L	Manufacturing Processes and Manufacturing Processes Laboratory ⁴	4
ME 474	Fundamentals of Heat and Mass Transfer	3
ME 480	Mechanical Engineering Seminar ⁴	3
ME 483	Mechanical Measurements Laboratory ⁴	3
ME 487	Engineering Design ⁴	2
ME 488	Engineering Design ⁴	3
Total Credits		39

III. Program Required Electives

Code	Title	Credits
Technical Electives - see details below ³		21
Total Credits		21

IV. College of Engineering and Mines requirements

Code	Title	Credits
ENGR 200	Computer Applications in Engineering ^{1,2}	2
ENGR 201	Statics ¹	3
ENGR 202	Dynamics ¹	3
ENGR 203	Mechanics of Materials ¹	3
ENGR 206	Fundamentals of Electrical Engineering	3
ENGR 340	Professional Integrity in Engineering ²	3
ENGR 460	Engineering Economy	3
Total Credits		20

V. Requirements outside of the College of Engineering and Mines

Code	Title	Credits
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory ¹	4
MATH 165	Calculus I ¹	4
MATH 166	Calculus II ¹	4
MATH 265	Calculus III ¹	4
MATH 266	Elementary Differential Equations	3
MATH 321	Applied Statistical Methods ⁵	3
PHYS 251	University Physics I ¹	4
PHYS 252	University Physics II ¹	4
Total Credits		30

Technical Electives and Optional Concentrations

One technical elective must be taken from each stem from UND unless the student is pursuing the Aerospace Concentration (see below). Students may receive an *optional* concentration, documented on the transcript, in one of the listed stems as indicated.

Students who satisfactorily complete **one** of the following combinations of ME 397 and/or ME 497 credits can be granted a waiver for one technical elective:

- Total of at least 3 credits of ME 397
- Total of at least 6 credits of ME 497
- A combination of 1 credit of ME 397 and 4 credits of ME 497
- A combination of 2 credits of ME 397 and 2 credits of ME 497

The waived technical elective is considered as elective at large and is not specified into any one of the three Mechanical Engineering stems.

Mechanical Design Stem

Code	Title	Credits
ME 424	Systems Dynamics and Control (#)	3
ME 426	Mechanical Vibrations (#)	3
ME 429	Introduction to Finite Element Analysis (#)	3
ME 439	Introduction to Robotics	3
ME 484	Ground Vehicle Dynamics	3
ME 485	Multiphysics Modeling	3
ME 523	Advanced Machine Design (#)	3
ME 525	Metal Fatigue in Engineering (#)	3
ME 526	Advanced Vibrations (#)	3
ME 529	Advanced Finite Element Methods (#)	3
ME 530	UAS in Engineering Design and Applications (#)	3
ME 532	Advanced Dynamics (#)	3
ME 566	Introduction to Machine Vision (#)	3
ME 580	Introduction to Autonomous Robotics (#)	3
AE 423	Aerospace Structures	3
AE 424	Flight Dynamics and Control	3

Mechanical Design Concentration - 128 hours

Requires ME 323 Machine Component Design/ME 323L Machine Component Design Laboratory and any four of the Mechanical Design Stem technical electives.

Thermal Sciences Stem

Code	Title	Credits
ME 342	Intermediate Thermodynamics (#)	3
ME 446	Gas Turbines (#)	3
ME 449	Internal Combustion Engines (#)	3
ME 451	Heating and Air Conditioning	3
ME 464	Computational Fluid Dynamics (#)	3
ME 466	Aerodynamics (#)	3
ME 476	Intermediate Fluid Mechanics (#)	3
ME 477	Compressible Fluid Flow (#)	3
ME 542	Thermodynamics of Materials	3
ME 545	Fluidized-Bed Combustion Engineering	3
ME 574	Advanced Heat Transfer (#)	3
ME 575	Conduction and Radiation Heat Transfer (#)	3
ME 576	Convective Heat Transfer (#)	3

Thermal Sciences Concentration - 128 hours

Requires ME 306 Fluid Mechanics, ME 341 Thermodynamics and any four of the Thermal Sciences Stem technical electives.

Manufacturing and Materials Stem

Code	Title	Credits
ME 313	Material Properties and Selection	3
ME 417	Friction, Wear and Lubrication	3
ME 420	Composite Materials (#)	3
ME 428	Advanced Manufacturing Processes	3
ME 439	Introduction to Robotics	3
ME 514	High Temperature Materials (#)	3
ME 515	Advanced Processing of Materials and Biomaterials	3
ME 524	Deformation and Fracture (#)	3
ME 525	Metal Fatigue in Engineering (#)	3
ME 542	Thermodynamics of Materials	3
ME 580	Introduction to Autonomous Robotics (#)	3

Manufacturing and Materials Concentration - 128 hours

Requires ME 418 Manufacturing Processes and any four of the Manufacturing and Materials Stem technical electives.

Aerospace Concentration - 133 hours

Requires students to complete AVIT 102 Introduction to Aviation (5 credits) plus seven technical electives. AVIT 102 Introduction to Aviation includes earning a private pilot license and is recommended for the summer session between the freshman and sophomore years.⁶

Technical electives must be chosen from the aerospace group of electives as identified by # in the above technical elective listing. One of the technical electives must be either ME 429 Introduction to Finite Element Analysis or ME 464 Computational Fluid Dynamics. ME 490 Special Laboratory Problems or an ME 590 Special Topics may also be included in the aerospace group at the discretion of the Mechanical Engineering Chair.

¹ Students must achieve a grade of "C" or better.

² ME 101 Introduction to Mechanical Engineering, ME 201 Student Design, ENGR 200 Computer Applications in Engineering and ME 397 Cooperative Education may be waived by successful completion of ME 102 Professional Assessment and Evaluation. The ethics requirement as represented by ENGR 340 Professional Integrity in Engineering may also be waived, but not the University's Essential Studies Requirements.

³ Three technical electives must be completed from UND, one in each stem unless pursuing the aerospace concentration. One technical elective can be taken outside the ME Department within other CEM Departments, Math or Physics. The course must be at the 300-level or higher and be consistent with the student's individual learning plan.

⁴ Course must be completed from UND.

⁵ ChE 315 of an alternative calculus-based statistics course may be substituted for MATH 321 with approval of the ME Department.

⁶ Students already holding a private pilot license may provide proof of this certification to the ME Department as a substitute for AVIT 102 Introduction to Aviation.

* All transfer courses must be completed with a grade of "C" or better.

The following courses must be completed with a grade of "C" or better: ENGL 110, ENGL 130, MATH 165, MATH 166, MATH 265, CHEM 121, CHEM 121L, PHYS 251, PHYS 252, ENGR 200, ENGR 201, ENGR 202, ENGR 203, ME 101, ME 201, and ME 341.

Students must ensure all appropriate pre-requisites are met prior to registering for all courses in the curriculum.