

Mechanical Engineering (BS)

Overview

Plan Requirements

First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory ¹	1
E 101	Introduction to Engineering & Problem Solving ²	1
E 115	Introduction to Computing Environments	1
MA 141	Calculus I ¹	4
Acad Writing Research (p. 2) ²		4
Select one of the following Economic courses:		3
ARE 201	Introduction to Agricultural & Resource Economics	
ARE 201A	Introduction to Agricultural & Resource Economics	
EC 201	Principles of Microeconomics	
EC 205	Fundamentals of Economics	
Hours		17

Spring Semester

CSC 113	Introduction to Computing - MATLAB	3
MA 241	Calculus II ¹	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ¹	4
GC 120	Foundations of Graphics	3
E 102	Engineering in the 21st Century	2
Hours		16

Second Year

Fall Semester		Hours
MA 242	Calculus III	4
MAE 206	Engineering Statics ²	3
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4
MAE 200	Introduction to Mechanical Engineering Design	1
ST 370	Probability and Statistics for Engineers	3
Hours		15

Spring Semester

MA 341	Applied Differential Equations I	3
MAE 208	Engineering Dynamics ²	3
MAE 201	Thermal-Fluid Sciences ²	3
MAE 214	Solid Mechanics ²	3
MAE 305	Mechanical Engineering Laboratory I	1
Hours		13

Third Year

Fall Semester

ENG 331	Communication for Engineering and Technology	3
MAE 302	Engineering Thermodynamics II	3
MAE 306	Mechanical Engineering Laboratory II	1
MAE 308	Fluid Mechanics	3
MAE 315	Fundamentals of Vibrations	3
Hours		13

Spring Semester

ECE 331	Principles of Electrical Engineering	3
MAE 310	Heat Transfer Fundamentals	3
MAE 316	Strength of Mechanical Components	3
MSE 200	Mechanical Properties of Structural Materials	3
Tech Elective (p. 2)		3
Hours		15

Fourth Year

Fall Semester

MAE 435	Principles of Automatic Control	3
MAE 405	Controls Lab	1
ISE 311	Engineering Economic Analysis	3
Select one of following ME Senior Design Part 1:		3
MAE 415	Mechanical Engineering Design I (This course should be followed by MAE 416)	
MAE 482	Engineering Entrepreneurship and New Product Development I (This course should be followed by MAE 483)	
Tech Elective (p. 2)		3
Hours		13

Spring Semester

Select one of following ME Senior Design Part 2 based on Senior Design Part 1 choice:		4
MAE 416	Mechanical Engineering Design II	
MAE 483 & MAE 484	Engineering Entrepreneurship and New Product Development II and Engineering Entrepreneurship Senior Design Lab	
Tech Elective (p. 2)		3
Ethics Elective (p. 2)		
Hours		7
Total Hours		109

¹ A grade of C or higher is required.

² A grade of C- or higher is required.

Code	Title	Hours	Counts towards
GEP Courses			
	GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	6	

GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	2
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)	3
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)	
Foreign Language Proficiency (verify requirement)	
Total Hours	17

Ethics Elective

Code	Title	Hours	Counts towards
IDS 201	Environmental Ethics	3	
MS 402	Advanced Military Science - Military Justice, Ethics and Professionalism	3	
NS 420	Naval Leadership and Ethics	3	
PHI 214	Issues in Business Ethics	3	
PHI 227	Data Ethics	3	
PHI/STS 325	Bio-Medical Ethics	3	
PHI 375	Ethics	3	
STS 302	Contemporary Science, Technology and Human Values	3	
STS 304	Ethical Dimensions of Progress	3	

Acad Writing Research

Code	Title	Hours	Counts towards
Acad Writing Research			
ENG 101	Academic Writing and Research	4	

FLE 101	Academic Writing and Research	4
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Transfer Sequence

ENG 1GEP		3
ENG 202	Disciplinary Perspectives in Writing	3

Tech Electives

Code	Title	Hours	Counts towards
Choose From:			

ME technical electives

MAE 342	Introduction to Automotive Engineering	3	
MAE 403	Air Conditioning	3	
MAE 406	Energy Conservation in Industry	3	
MAE 407	Steam and Gas Turbines	3	
MAE 408	Internal Combustion Engine Fundamentals	3	
MAE 410	Modern Manufacturing Processes	3	
MAE 412	Design of Thermal System	3	
MAE 413	Design of Mechanical Systems	3	
MAE 420	Dynamic Analysis of Human Movement	3	
MAE 421	Design of Solar Energy Systems	3	
MAE 426	Fundamentals of Product Design	3	
MAE 430	Applied Finite Element Analysis	3	
MAE 440	Non-Destructive Testing and Evaluation	3	
MAE 495	Special Topics in Mechanical and Aerospace Engineering	1-3	
MAE 496	Undergraduate Project Work in Mechanical and Aerospace Engineering	1-6	

AE technical electives

MAE 452	Aerodynamics of V/STOL Vehicles	3	
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MAE 455	Boundary Layer Theory	3
MAE 456	Computational Methods in Aerodynamics	3
MAE 457	Flight Vehicle Stability and Control	3
MAE 459	Rocket Propulsion	3
MAE 458	Propulsion	3
MAE 467	Introduction to Space Flight	3
MAE 470	Space Exploration Systems	3
MAE 472	Aerospace Structures II	3
MAE 500-level courses (with departmental approval)		
Available to students who are admitted to an engineering ABM program OR have a minimum 3.5 overall GPA and completed all required 3rd year MAE lecture courses		
MAE 501	Advanced Engineering Thermodynamics	3
MAE 504	Fluid Dynamics Of Combustion I	3
MAE 505	Heat Transfer Theory and Applications	3
MAE 511	Advanced Dynamics I	3
MAE 513	Principles of Structural Vibration	3
MAE 515	Advanced Automotive Vehicle Dynamics	3
MAE 517	Advanced Precision Manufacturing for Products, Systems and Processes	3
MAE 518	Acoustic Radiation I	3
MAE 520	Dynamic Analysis of Human Movement	3
MAE 521	Linear Control and Design For MIMO Systems	3

MAE 522	Non Linear System Analysis and Control	3
MAE 525	Advanced Flight Vehicle Stability and Control	3
MAE 526	Fundamentals of Product Design	3
MAE 528	Experimental Flight Testing	3
MAE 531	Engineering Design Optimization	3
MAE 532	Smart Structures and Micro-Transducers	3
MAE 533	Finite Element Analysis I	3
MAE 534	Mechatronics Design	3
MAE 535	Design of Electromechanical Systems	3
MAE 536	Micro/Nano Electromechanical Systems	3
MAE 537	Mechanics Of Composite Structures	3
MAE 538	Smart Structures and Materials	3
MAE 539	Advanced Materials	3
MAE 540	Advanced Air Conditioning Design	3
MAE 541	Advanced Solid Mechanics I	3
MAE 543	Fracture Mechanics	3
MAE 544	Robot Mechanics and Control	3
MAE 545	Metrology For Precision Manufacturing	3
MAE 546	Photonic Sensor Applications in Structure	3
MAE 550	Foundations Of Fluid Dynamics	3
MAE 551	Airfoil Theory	3
MAE 552	Introduction to Experimental Fluid Dynamics and Measurement Systems	3

MAE 553	Compressible Fluid Flow	3
MAE 554	Hypersonic Aerodynamics	3
MAE 555	Applications of Acoustic and Elastic Wave Propagation	3
MAE 558	Microfluidics and Nanofluidics	3
MAE 560	Computational Fluid Mechanics and Heat Transfer	3
MAE 561	Wing Theory	3
MAE 562	Physical Gas Dynamics	3
MAE 570	Space Exploration Systems	3
MAE 573	Hydrodynamic Stability and Transition	3
MAE 575	Advanced Propulsion Systems	3
MAE 577	Multiscale Two-phase Flow Simulations	3
MAE 589	Special Topics In Mechanical and Aerospace Engineering	1-6

Other engineering technical electives (with departmental approval)

Contact your MAE academic advisor for options

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory ¹	1
E 101	Introduction to Engineering & Problem Solving ²	1
E 115	Introduction to Computing Environments	1
ENG 101	Academic Writing and Research ²	4
MA 141	Calculus I ¹	4
Select one of the following Economics courses:		3
EC 205	Fundamentals of Economics	
EC 201	Principles of Microeconomics	
ARE 201	Introduction to Agricultural & Resource Economics	

GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1
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Hours 18

Spring Semester

CSC 113	Introduction to Computing - MATLAB	3
MA 241	Calculus II ¹	4
PY 205	Physics for Engineers and Scientists I ¹	3
PY 206	Physics for Engineers and Scientists I Laboratory ¹	1
E 102	Engineering in the 21st Century	2
GC 120	Foundations of Graphics	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1	

Hours 17

Second Year

Fall Semester

MA 242	Calculus III	4
MAE 200	Introduction to Mechanical Engineering Design	1
PY 208	Physics for Engineers and Scientists II	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
MAE 206	Engineering Statics ²	3
ST 370 or ST 371	Probability and Statistics for Engineers or Introduction to Probability and Distribution Theory	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3	

Hours 18

Spring Semester

MA 341	Applied Differential Equations I	3
MAE 208	Engineering Dynamics ²	3
MAE 201	Thermal-Fluid Sciences ²	3
MAE 214	Solid Mechanics ²	3
MAE 305	Mechanical Engineering Laboratory I	1
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3	

Hours 16

Third Year

Fall Semester

ENG 331	Communication for Engineering and Technology	3
MAE 308	Fluid Mechanics	3
MAE 315	Fundamentals of Vibrations	3
MAE 306	Mechanical Engineering Laboratory II	1
MAE 302	Engineering Thermodynamics II	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3	

Hours 16

Spring Semester

MAE 310	Heat Transfer Fundamentals	3
ECE 331	Principles of Electrical Engineering	3

MSE 200	Mechanical Properties of Structural Materials	3
MAE 316	Strength of Mechanical Components	3
Technical Elective (p. 2)		3
Hours		15
Fourth Year		
Fall Semester		
MAE 435	Principles of Automatic Control	3
MAE 405	Controls Lab	1
ISE 311	Engineering Economic Analysis	3
Select one of following ME Senior Design Part 1:		3
MAE 415	Mechanical Engineering Design I (This course should be followed by MAE 416)	
MAE 482	Engineering Entrepreneurship and New Product Development I (This course should be followed by MAE 483)	
Technical Elective (p. 2)		3
Hours		13
Spring Semester		
Select one of following ME Senior Design Part 2 based on Senior Design Part 1 choice:		4
MAE 416	Mechanical Engineering Design II	
MAE 483 & MAE 484	Engineering Entrepreneurship and New Product Development II and Engineering Entrepreneurship Senior Design Lab	
Technical Elective (p. 2)		3
Ethics ((p. 2)GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/))		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		13
Total Hours		126

¹ Courses required for Change of Degree Audit (CODA). A grade of C or higher is required.
² A grade of C- or higher is required, E 115 requires satisfactory completion (S).

Career Opportunities

Career Titles

- Aeronautical & Aerospace Engineer
- Agricultural Engineer
- Airport Engineer
- Automotive Engineer
- Civil Engineering Technician
- Cost Estimator
- Energy Engineer
- Engineering Professor
- Environmental Engineer
- Fuel Cell Engineers
- Industrial Designer
- Industrial Engineer

- Industrial Engineering Technician
- Materials Engineer
- Mechanical Engineer
- Mechanical Engineering Technician
- Mechanical Engineering Technologists and Technicians
- Mechatronics Engineers
- Nuclear Engineer
- Nuclear Fuels Research Engineer
- Operating Engineer
- Petroleum Engineer
- Photogrammetrist
- Photonics Engineers
- Product Safety Engineer
- Quality Control Managers
- Robotics Engineers
- Sanitary Engineer
- Solar Energy Systems Designer
- Solar Energy Systems Engineers
- Structural Engineer
- Sustainability Specialists
- Tool and Machine Designer
- Transportation Engineer
- Wind Energy Engineer
- Wind Turbine Service Technicians

Learn More About Careers

NCcareers.org (<https://nccareers.org/>)
 Explore North Carolina’s central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)
 Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)
 View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)
 This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)
 A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

American Society of Mechanical Engineers (<https://www.asme.org/>)

American Society of Heating, Refrigeration & Air Conditioning Engineers

(<https://www.ashrae.org/>)

Society of Automotive Engineers (<https://www.sae.org/>)

National Society of Professional Engineers (<https://www.nspe.org/>)