

# ENGINEERING MECHANICS: ASTRONAUTICS

## REQUIREMENTS

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The following curriculum applies to students admitted to the engineering mechanics degree program and declared the astronautics option.

#### SUMMARY OF REQUIREMENTS

Code	Title	Credits
	Mathematics and Statistics	22
	Science	10
	Engineering Science	27
	Engineering Mechanics/Astronautics Core	40
	Technical Electives	5
	Communication Skills	8
	Liberal Studies	16
<b>Total Credits</b>		<b>128</b>

#### MATHEMATICS AND STATISTICS

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry 1	5
or MATH 217	Calculus with Algebra and Trigonometry II	
MATH 222	Calculus and Analytic Geometry 2	4
MATH 234	Calculus--Functions of Several Variables	4
MATH 320	Linear Algebra and Differential Equations	3
MATH 321	Applied Mathematical Analysis 1: Vector and Complex Calculus	3
STAT 324	Introduction to Statistics for Science and Engineering	3
<b>Total Credits</b>		<b>22</b>

#### SCIENCE

Code	Title	Credits
Select one of the following:		5-9
CHEM 109	Advanced General Chemistry	
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
PHYSICS 202	General Physics	5
<b>Total Credits</b>		<b>10-14</b>

#### ENGINEERING SCIENCE

Code	Title	Credits
INTEREGR 170	Design Practicum	3
M E 231	Geometric Modeling for Design and Manufacturing	3

E P 271	Engineering Problem Solving I	3
or COMP SCI 200	Programming I	
or COMP SCI 220	Data Science Programming I	
or COMP SCI 310	Problem Solving Using Computers	
M E 361	Thermodynamics	3
M E 363	Fluid Dynamics	3
or CIV ENGR 310	Fluid Mechanics	
E C E 376	Electrical and Electronic Circuits	3
or PHYSICS 321	Electric Circuits and Electronics	
M E 364	Elementary Heat Transfer	3
E C E 332	Feedback Control Systems	3
or M E 446	Introduction to Feedback Control	
Computing Elective (select one)		3
COMP SCI 300	Programming II	
COMP SCI 412	Introduction to Numerical Methods	
E M A/E P 471	Intermediate Problem Solving for Engineers	
E M A/E P 476	Introduction to Scientific Computing for Engineering Physics	

**Total Credits** **27**

#### ENGINEERING MECHANICS/ASTRONAUTICS CORE

Code	Title	Credits
<b>Required Courses</b>		
E M A 201	Statics	3
E M A 202	Dynamics	3
E M A 303	Mechanics of Materials	3
E M A/M E 307	Mechanics of Materials Lab	1
E M A 405	Practicum in Finite Elements	3
E M A 469	Design Problems in Engineering	3
E M A 506	Advanced Mechanics of Materials I	3
<b>Experimental Mechanics</b>		
Select one of the following:		
E M A/M E 540	Experimental Vibration and Dynamic System Analysis	3
E M A/M E 570	Experimental Mechanics	
E M A 611	Advanced Mechanical Testing of Materials	
E M A 522	Aerodynamics Lab	
E M A 521	Aerodynamics	3
or M E 563	Intermediate Fluid Dynamics	
E M A 542	Advanced Dynamics	3
E M A 545	Mechanical Vibrations	3
E M A 569	Senior Design Project	3
<b>Spacecraft &amp; Structural Dynamics Elective (select one)</b>		<b>3</b>
E M A/ ASTRON 550	Astroynamics	
E M A 610	Structural Finite Element Model Validation	
E M A 642	Satellite Dynamics	
<b>Aerospace Fluid Mechanics Elective (select one)</b>		<b>3</b>

E M A 523	Flight Dynamics and Control	
E M A 601	Special Topics in Engineering Mechanics (Topic: Rocket Propulsion)	
or E M A 524	Rocket Propulsion	
<b>Total Credits</b>		<b>40</b>

honors research, including a senior thesis. Further information is available in the department office.

For information on credit load, adding or dropping courses, course substitutions, pass/fail, auditing courses, dean's honor list, repeating courses, probation, and graduation, see the College of Engineering Official Regulations (<http://guide.wisc.edu/undergraduate/engineering/#policiesandregulationstext>).

## TECHNICAL ELECTIVES

Code	Title	Credits
	Select five credits at an academic level that requires 2 semesters of calculus or 2 semesters of physics as a prerequisite. E M A 1 may also be used to satisfy this requirement.	5

## COMMUNICATION SKILLS

Code	Title	Credits
ENGL 100	Introduction to College Composition	3
or COM ARTS 100	Introduction to Speech Composition	
or LSC 100	Science and Storytelling	
or ESL 118	Academic Writing II	
INTEREGR 275	Technical Presentations (was EPD 275)	2
INTEREGR 397	Engineering Communication	3
<b>Total Credits</b>		<b>8</b>

## LIBERAL STUDIES

Code	Title	Credits
<b>College of Engineering Liberal Studies Requirements</b>		
	Complete Requirements ( <a href="https://guide.wisc.edu/undergraduate/engineering/#requirementsstext">https://guide.wisc.edu/undergraduate/engineering/#requirementsstext</a> ) <sup>1</sup>	16
<b>Total Credits</b>		<b>16</b>

- <sup>1</sup> Students must take 16 credits that carry H, S, L, or Z breadth designators. These credits must fulfill the following subrequirements:
1. A minimum of two courses from the same subject area (<https://registrar.wisc.edu/subjectareas/>) (the description before the course number). At least one of these two courses must be designated as above the elementary level (I, A, or D) in the course listing.
  2. A minimum of 6 credits designated as humanities (H, L, or Z in the course listing), and an additional minimum of 3 credits designated as social science (S or Z in the course listing). Foreign language courses count as H credits. Retroactive credits for language courses may not be used to meet the Liberal Studies credit requirement (they can be used for subrequirement 1 above).
  3. At least 3 credits in courses designated as ethnic studies (lower case "e" in the course listing). These courses may help satisfy subrequirements 1 and 2 above, but they count only once toward the total required. *Note:* Some courses may have "e" designation but not H, S, L, or Z designation; these courses do not count toward the Liberal Studies requirement.

## HONORS IN UNDERGRADUATE RESEARCH

Qualified undergraduates may earn an Honors in Research designation on their transcript and diploma by completing 8 credits of undergraduate