UNDERGRADUATE STUDENT GUIDE TO THE MECHANICAL ENGINEERING DEPARTMENT

The State University of New York, Korea

Department of Mechanical Engineering

Effective fall 2023

Undergraduate Student Guide to the Mechanical Engineering Department

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How to Use This Guide

For new students and transfer students
This guide provides an overview of our program, the degree requirements, and official department policy on nearly all aspects of the program. You are strongly encouraged to go through the guide in its entirety as soon as possible following admission to the program.

For students already in the program
Please see the *Recent Changes* section for a quick summary of Course and Curriculum changes.

Additional Resources
An electronic copy of this document can be found on the Department's website

http://me.sunykorea.ac.kr

About Mechanical Engineering

Mechanical engineering is one of the core disciplines of engineering. It encompasses a large number of subdisciplines that are at the heart of both traditional and leading-edge technologies. Mechanical engineers can be found in leadership roles in almost any sector of industry, ranging from electronics and aerospace to civil transportation and consumer household products. The undergraduate mechanical engineering program at Stony Brook recognizes that students have a variety of career path objectives within the wide variety of industrial environments available to mechanical engineers. While the majority of our graduates directly pursue careers in industry, asignificant percentage of them join graduate schools. Most of the students entering graduate schools continue their mechanical engineering studies. However, many of them have gone to law, business and medical schools. The under- graduate curriculum in mechanical engineering is designed to provide students with the detailed mechanical engineering education and training required for immediate entry into the job market. At the same time, the curriculum maintains enough flexibility to enable students to fully prepare themselves for graduate studies and research careers.

Curriculum Overview

The undergraduate mechanical engineering curriculum includes the Stony Brook Curriculum (SBC) required by the university, as well as a core curriculum designed for the mechanical engineering major. The core curriculum provides students with a solid education in mathematics and the physical sciences along with a broad sequence of courses covering thermal processes andfluid mechanics, mechanical design, solid mechanics, and the dynamic behavior and control ofmechanical systems. Students also take courses that introduce them to the use of advanced computational methods for engineering design and analysis as well as data processing and analysis.A series of laboratory courses introduces them to sensors and electronics, modern instrumentationand experimental techniques used in engineering for tasks ranging from product design, evaluation and testing to research. In addition, students can select electives to provide either higher level academic training in preparation for graduate school or a broader exposure to subjects related to engineering practice to enhance their preparation for a job after graduation.

MEC Mission Statement

The mission of the Mechanical Engineering Department is to

- provide an ABET-accredited program for undergraduate education that prepares students for a career in mechanical engineering and related fields;
- provide graduate education and research opportunities for students and practicing engineers;
- perform cutting-edge research and provide technology transfer to regional and national industries.

Program Educational Objectives:

The objective of our Bachelors of Engineering Program in Mechanical Engineering is to produce highly competent professionals to serve the needs of our rapidly evolving technological society:

- Graduates will meet the expectations of employers of Mechanical engineers.
- Qualified graduates will pursue advanced studies if they so desire.
- Graduates will be able to pursue leadership positions globally in their professions.

Student Outcomes:

The mechanical engineering faculty has adopted the engineering criteria "1" through "7" student outcomes, namely:

1) An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2) An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4) An ability to communicate effectively with a range of audiences.
5) 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.
6) An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7) An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Introduction

This guide is provided to incoming or transferring Mechanical Engineering undergraduate students to assist them in selecting the sequence of courses needed to obtain a Bachelor of Engineering degree in Mechanical Engineering. It is extremely important that students carefully study the information given in this guide, know the recommended sequence of courses and be familiar with the prerequisites for these courses. They should consult their advisors before deviating from the recommended course scheduling sequence. As part of a continuing effort to improve our educational program, the degree requirements for the Bachelor of Engineering in Mechanical Engineering may change. This guide describes the degree requirements that apply to all students who enter the major during or after the Fall 2016–Spring 2017 academic year.

Acceptance Requirements for the Mechanical Engineering Major

Freshman and transfer applicants who have specified their interest in the Mechanical Engineering major may be accepted directly into the major upon admission to the University. Students not accepted directly may apply for acceptance after completing their first semester at the University. Acceptance is based upon a student's achievement in 10 or more credits of mathematics, physics, and engineering courses that are taken at Stony Brook and satisfy the Major's requirements. In these courses, a student must achieve a grade point average (G.P.A.) of at least 3.0 with no more than one grade of a C or lower. Students who do not meet these requirements after two semesters of working towards the Major are disqualified and should not apply. The first semester of working towards the Major will be determined by a student's first MEC course that applies towards Major degree requirements. All transfers courses used to meet requirements of the major must be completed prior to admission. Students interested in applying for admission are encouraged to talk to the Under-graduate Program Director (listed in the front matter of this document).

Bachelor of Engineering Degree Requirement for the Mechanical Engineering Major

Students following a program of study leading to a B.E. degree must satisfy the general education requirements of the university, as well as the requirements of the major, which comprises of a core of mandated courses and a set of three approved technical electives. The total number of credits required for a B.E. degree in mechanical engineering is 128.

General Education Requirements:

For students starting Fall 2014, the new general education requirements are described in the Undergraduate Bulletin. **EST 392 (or ECO 108) is a required course to satisfy category SBS.** You can also view them at http://www.stonybrook.edu/commcms/gened/requirements.html.

For students prior to Fall 2014, you can view the DEC requirements at: http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/degree_requirements/diversi- fied.php. **EST 392 (or ECO 108) is a required DEC course for Mechanical Engineering majors and satisfies letter category F**.

Requirements for the Major in Mechanical Engineering (MEC)

Qualified freshman and transfer students who have indicated their interest in the major on their applications may be admitted directly as a degree major or as a pre-major. Pre-majors are placed into the Area of Interest (AOI) program and to be eligible for the degree, they must be admitted to and declare the major. The requirements and application process for matriculation are detailed below. Students admitted to other programs within the College of Engineering and Applied Science (CEAS) follow the same admissions process as students in the AOI program. Students in programs outside of CEAS (non-CEAS students) and double major applicants may apply for admission to the degree program following a separate process, outlined below.

Intellectual honesty and academic integrity are cornerstones of academic and scholarly work. The department may table any applications for major/minor admission until academic judiciary matters are resolved. An academic judiciary matter will be identified by a grade of "Q" in the instance of a first offense Area of Interest and Other CEAS Students (excluding double major applicants) Applications for major admission from AOI and other CEAS students are reviewed twice per year and must be received by January 5 for Spring admission and June 5 for Fall admission. Students who submit their application on time will be admitted if they meet the following requirements:
• PHY 131 or PHY 126 or PHY 127 or their equivalents, • One MEC course required for the major and taken at Stony Brook, • Earn 10 or more credits of mathematics, physics, and engineering courses that are taken at Stony Brook and satisfy the Major's requirements, • Obtain a grade point average (G.P.A.) of at least 3.2 in major courses with no more than one grade below B-, and • No courses required for the major have been repeated.
Students must complete these requirements no later than one year after they enroll in the first course that applies towards major entry. Students must apply for admission by the application deadline immediately following completion of the above requirements, but no later than the one-year limit. Admission of AOI students and other CEAS students who apply late will follow the process of Non-CEAS Students and Double Major Applicants below.

Non-CEAS Students and Double Major Applicants Applications for major admission from non-CEAS students and double major applicants are reviewed twice per year and must be received byJanuary 5 for Spring admission and June 5 for Fall admission. Students who do not meet the requirements for AOI admission above will not be considered. Fulfilling the requirements does not guarantee acceptance. Admission is competitive and contingent upon program capacity.

Requirements for the Major in Mechanical Engineering (MEC)

The major in Mechanical Engineering leads to the Bachelor of Engineering degree.
Completion of the major requires approximately 107 credits.

1. Mathematics

a. MAT 131, MAT 132 Calculus I, IIb. AMS 261 Applied Calculus III or MAT 203 Calculus III with Applications c. AMS 361 Applied Calculus IV: Differential Equations or MAT 303 Calculus IV with Applications. AMS 210 Applied Linear Algebra or MAT 211 Introduction to Linear Algebra
Note: The following alternate calculus course sequences may be substituted for MAT 131, MAT 132 in major requirements or prerequisites: MAT 125, MAT 126, MAT 127 or AMS 151, AMS 161 or MAT 141, MAT 142

2. Natural Sciences

a. PHY 131/PHY 133, PHY 132/PHY 134 Classical Physics I, II and Laboratories. A basic science elective to be selected from the following list of courses: PHY 251/252, Modern Physics/Modern Physics Laboratory; ESG281, Engineering Introduction to the Solid State; PHY 300, Waves and Optics; CHE 132 General Chemistry II; BIO 202, Fundamentals of Biology: Molecular and Cellular Biology; BIO 203, Fundamentals of Biology: Cellular and Organ Physiology; GEO 310, Introduction to Geophysics; GEO 312, Structure and Properties of Materials; AST 203, Astronomy; AST 205, Introduction to Planetary Sciences; ATM 205,Introduction to Atmospheric Sciences. ESG 198 Fundamentals of Engineering Chemistry or CHE 131 General Chemistry or CHE 152 Molecular Science I
Notes: The following alternate physics course sequences may be substituted for PHY 131/PHY 133, PHY 132/PHY 134: PHY 125, PHY 126, PHY 127,PHY 133, PHY 134 Classical Physics A, B, C and Laboratories or PHY 141, PHY 142, PHY 133, PHY 134 Classical Physics I, II: Honors The following chemistry course may be substituted for ESG 198: CHE 131 General Chemistry I or CHE 152 Molecular Science I

3. Laboratories

MEC 316 Instrumentation and Solid Mechanics Laboratory
MEC 317 Thermal Sciences and Fluid Mechanics Laboratory

4. Mechanical Engineering

MEC 101 Freshman Design Innovation
MEC 102 Engineering Computing and Problem Solving

MEC 203 Engineering Graphics and CAD
MEC 220 Practical Electronics for Mechanical Engineers
MEC 225 Fundamentals of Machining Practices or MEC 226 Modern Machining Practices
MEC 260 Engineering Statics
MEC 262 Engineering Dynamics
MEC 301 Thermodynamics
MEC 305 Heat and Mass Transfer
MEC 325 Manufacturing Processes
MEC 363 Mechanics of Solids
MEC 364 Introduction to Fluid Mechanics

5. Materials Science
ESG 332 Materials Science I: Structure and Properties of Materials

6. Engineering Design
MEC 310 Introduction to Machine Design
MEC 320 Numerical Methods in Engineering Design and Analysis
MEC 410 Design of Machine Elements
MEC 411 System Dynamics and Controls
MEC 422 Thermal System Design
MEC 440 Mechanical Engineering Design I
MEC 441 Mechanical Engineering Design II

7. Engineering Economics
EST 392 Engineering Economics or ECO 108 Introduction to Economics

8. Technical Electives
Three technical elective courses are required, two mechanical engineering (MEC) courses and one selected from courses offered by any department of the College of Engineering and Applied Sciences, including MEC. A list of approved technical elective courses may be found in the Department's Undergraduate Guide.

9. Upper-Division Writing and Engineering Ethics
MEC 300 Professional Conduct for Engineers

Grading
The grade point average of all required MEC courses and all technical electives must be at least 2.00. When a course is repeated, the higher grade will be used in calculating this average. A minimum grade of "C" in MEC 441 is required for the B.E. degree.

The Minor in Mechanical Engineering
The minor in Mechanical Engineering is offered for students who want the record of their University studies to show a significant amount of upper-division work in the discipline. Entry into this minor presupposes a background in mathematics and physics, represented by the prerequisite requirements for the courses listed below.

Requirements for the Minor in Mechanical Engineering (MEC)
Completion of the minor requires 18-20 credits, of which 12-13 are from required courses and 6-7 from electives.A student who wishes to pursue this minor should consult with the undergraduate program director in the Department of Mechanical Engineering before registering for the elective courses. All courses must be taken for a letter grade and a g.p.a. of 2.00 or higher is required for the six courses that constitute the minor.

1. Four required courses:
MEC 260 Engineering Statics
MEC 262 Engineering Dynamics
MEC 301 Thermodynamics or ESG 302 Thermodynamics of Materials
MEC 363 Mechanics of Solids

2. Two elective courses chosen from the following:
MEC 305 Heat and Mass Transfer
MEC 310 Introduction to Machine Design
MEC 320 Numerical Methods in Engineering Design and Analysis

Stony Brook University: www.stonybrook.edu/ugbulletin3

MEC 325 Manufacturing Processes and Machining
MEC 364 Introduction to Fluid Mechanics
MEC 393 Engineering Fluid Mechanics
MEC 398 Thermodynamics II
MEC 402 Mechanical Vibrations
MEC 411 System Dynamics and Control
MEC 455 Applied Stress Analysis

Note: Other electives require the approval of the undergraduate program director.
The Accelerated B.E./M.S. Degree Program in Mechanical Engineering

The accelerated B.E./M.S. program in mechanical engineering allows students to use up to nine graduate credits taken as an undergraduate toward both B.E. and M.S. degree requirements, thus reducing the normal time required to complete both degrees. The program is designed for upper-division mechanical engineering students with superior academic records. For detailed program requirements, including admission requirements,please refer to the Graduate Bulletin.

Three Approved Technical Electives (see below)

Technical Electives

Threetechnicalelectivecoursesarerequired. At leasttwomust bemechanicalengineering(MEC) and the other may be selected from courses offered by any department of the College of Engineering and Applied Sciences, including MEC. The following is a list of approved technical elective courses:

Mechanical Engineering
MEC: 393, 398, **402**, 423, **442**, 450, 455, 456, **457, 464, 465, 470, 491, 492**, 499 (requires GPA of 3.0 or better). See note below on used of 500-level graduate courses as Technical Electives

Applied Math and Statistics:
AMS: 310**,** 311, 315, 341, 342, 351

Biomedical Engineering:
BME: 353, 481

Civil Engineering:
CIV: 310, 422

Chemical Engineering:
CME: 369

Computer Science:
CSE: 308, 327, 328, 352

Electrical Engineering:
ESE: 305, 306, 311, 330, 347, 350, 352, 380, 381

Material Science and Engineering
ESG: 333, 339
ESM: 335, 336, 353, 369, 486

Technology and Society
EST: 326, 327, 364, 391, 393

Other electives for the major require the approval of the undergraduate program director. Unless otherwise noted, all 500 level graduate MEC courses (excluding tutorials, MEC 599 and 699) will count as a technical elective. MEC 596 requires a GPA of 3.0 or better. You will need to complete a permission form in order to register for a graduate course.

For departments other than Mechanical Engineering, check with that department for the semester in which these courses are offered and their frequencies. Note that many of these courses have several prerequisites and/or co-requisites that must be satisfied in order to take the course.

Recommended Course Sequence

Table 2 shows a recommended course sequence. Due to strict pre- and co-requisite requirements, students are **strongly** advised to follow this course sequence. Any deviation from this course sequence should be discussed with the faculty advisor.

Table 2-1: Mechanical Engineering Recommended Course Sequence (Fall Admitted)

Course (Department, Number, Title)	(R)equired, (E)lective, or Selected Elective (SE).	Subject Area (Credit hours)		
		Math & Basic Sciences	Engineering (Checked (√) if Contains Significant Design)	Other
Fall Freshman: SUNY Korea				
AMS 151: Applied Calculus I	R[(b)]	3		
PHY 131: Classical Physics I	R[(b)]	3		
PHY 133: Classical Physics Laboratory I	R	1		
MEC 101: Freshman Design Innovation	R		3(√)	
MEC 203: Engineering Graphics and CAD	R		3	
Spring Freshman: SUNY Korea				
WRT 102: Intermediate Writing Workshop	R			3
AMS 161: Applied Calculus II	R[(b)]	3		
ESG 198: Fundamentals of Engineering Chemistry	R[(b)]	4		
MEC 102: Engineering Computing and Problem Solving	R		2	
PHY 132: Classical Physics II	R[(b)]	3		
PHY 134: Classical Physics Laboratory II	R	1		
Fall Sophomore: Stony Brook				
MEC 220: Practical Electronics Mechanical Engineers	R		3	
MEC 260: Engineering Statics	R		3	
Basic Science Elective	SE	3		
AMS 261: Applied Calculus III	R[(b)]	4		
HUM (SBC: Critical Anal. and the Methods of the Humanities)	SE			3
USA (SBC: Political, Econ., Social & Cultural History of US)	SE			3
Spring Sophomore: Stony Brook				
MEC 262: Engineering Dynamics	R		3	
MEC 363: Mechanics of Solids	R		3	
AMS 361: Applied Calculus IV: Differential Equations	R[(b)]	4		
AMS 210: Applied Linear Algebra	R[(b)]	3		
GLO & DIV (SBC: Engage Global and Diversity Issues)	R[(c)]			6
Fall Junior: SUNY Korea				
MEC 226: Modern Machining Practices	R		1	
MEC 301: Thermodynamics	R		3	
MEC 310: Introduction to Machine Design	R		3(√)	
MEC 316: Instrumentation and Solid Mechanics Laboratory	R		2(√)	
MEC 320: Numerical Methods in Eng. Design and Analysis	R		3	
MEC 325: Manufacturing Processes	R		3	
MEC 364: Introduction to Fluid Mechanics	R		3	
Spring Junior: SUNY Korea				
MEC 300: Technical Communication in Mech. Eng. (WRTD)	R		2	
MEC 305: Heat and Mass Transfer	R		3	
MEC 317: Thermal Sciences and Fluid Mechanics Laboratory	R		2	
MEC 410: Design of Machine Elements	R		3(√)	
MEC 411: Control System Analysis and Design0.	R		4(√)	
MEC 440: Mechanical Engineering Design I	R		3(√)	
Fall Senior: SUNY Korea				
MEC 441: Mechanical Engineering Design II	R		3(√)	
MEC 422: Thermal System Design	R		3(√)	
ESG 332: Materials Science I: Structure and Prop. of Materials	R		3	
Technical Elective #1	SE		3	
Technical Elective #2	R		3	
Spring Senior: SUNY Korea				
EST 392: Engineering and Managerial Economics (SBS)	R[(b)]			3
Technical Elective #3	R		3	
STAS (Relation b/w Sci., Tech. and Arts, Hum., Soc. Sci.)	SE			3
ARTS (SBC: Explore and Understand the Fine and Performance Arts)	R			3
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		32	73	23
PERCENT OF TOTAL		%26	%56	%18
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM			128	
Total must satisfy either credit hours or percentage	Minimum Semester Credit Hours	32 Hours	48 Hours	
	Minimum Percentage	%24	%36	

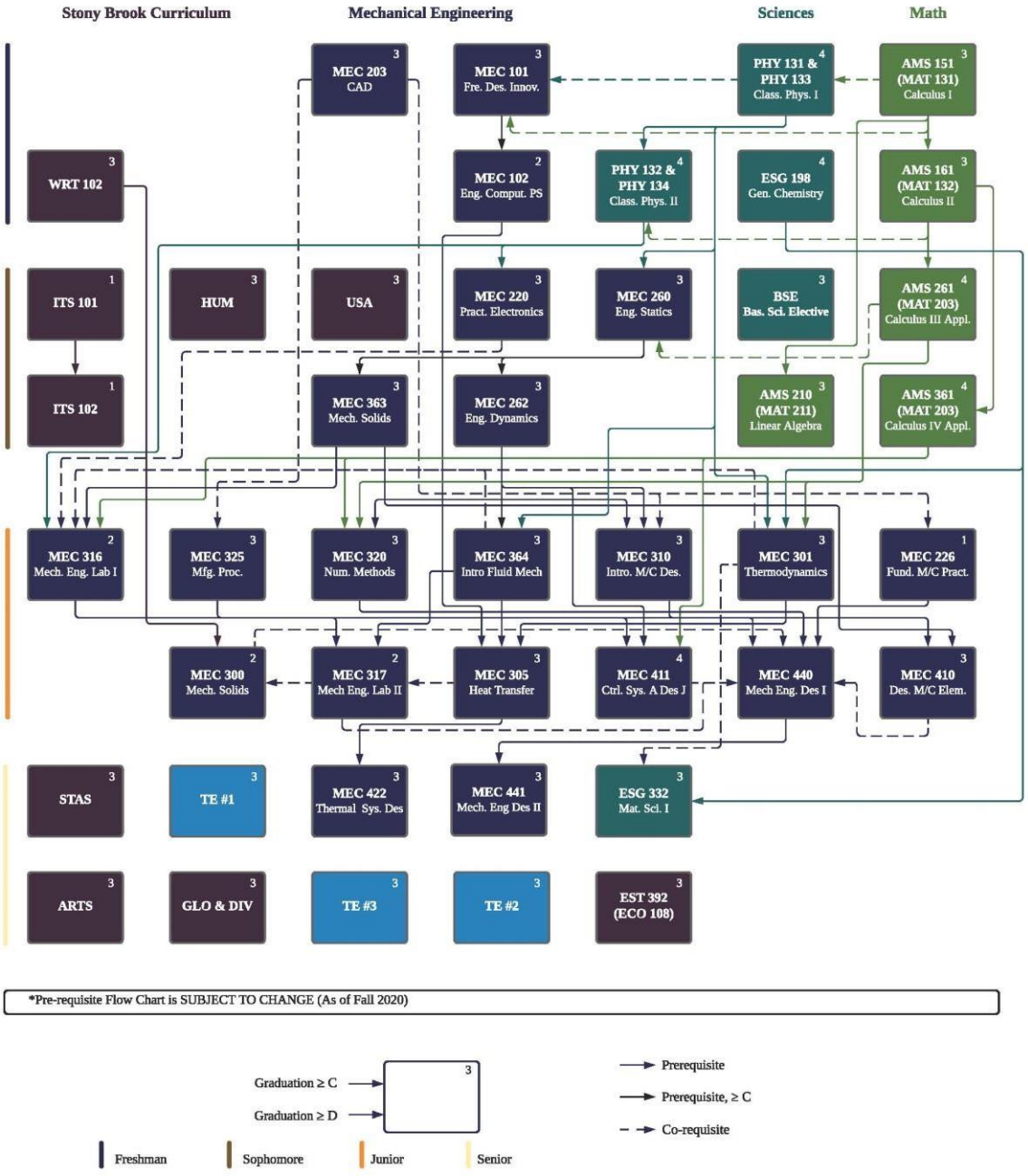
(a) ITS 101 and ITS 102 are First-Year Seminar courses required by all Freshman students and replaceable by 101/102 courses with designations ACH, GLS, HDV, LDS, or SSO. Transfer students take ADV 101 instead of ITS 101 and are not required to take ITS 102.
(b) This course may be replaced by one or more courses with a similar title, per Graduation Requirement detailed in Criterion 1.
(c) DIV requirement applies to student admitted or re-matriculated after Fall 2019

Table 2-2: Mechanical Engineering Recommended Course Sequence (Spring Admitted)

Course (Department, Number, Title)	(R)equired, (E)lective, or Selected Elective (SE).	Subject Area (Credit hours)		
		Math & Basic Sciences	Engineering (Checked (√) if Contains Significant Design)	Other
Spring Freshman: SUNY Korea				
AMS 151: Applied Calculus I	R[(b)]	3		
PHY 131: Classical Physics I	R[(b)]	3		
PHY 133: Classical Physics Laboratory I	R	1		
MEC 101: Freshman Design Innovation	R		3(√)	
MEC 203: Engineering Graphics and CAD	R		3	
Fall Freshman: SUNY Korea				
WRT 102: Intermediate Writing Workshop	R			3
AMS 161: Applied Calculus II	R[(b)]	3		
AMS 210: Applied Linear Algebra	R[(b)]	3		
PHY 132: Classical Physics II	R[(b)]	3		
PHY 134: Classical Physics Laboratory II	R	1		
Spring Sophomore: SUNY Korea				
ESG 198: Fundamentals of Engineering Chemistry	R[(b)]	4		
MEC 102: Engineering Computing and Problem Solving	R		2	
ARTS (SBC: Explore and Understand the Fine and Performance Arts)	R			3
STAS (Relation b/w Sci., Tech. and Arts, Hum., Soc. Sci.)	SE			3
EST 392: Engineering and Managerial Economics (SBS)	R[(b)]			3
Fall Sophomore: Stony Brook				
MEC 220: Practical Electronics Mechanical Engineers	R		3	
MEC 260: Engineering Statics	R		3	
AMS 261: Applied Calculus III	R[(b)]	4		
Basic Science Elective	SE	3		
HUM (SBC: Critical Anal. and the Methods of the Humanities)	SE			3
USA (SBC: Political, Econ., Social & Cultural History of US)	SE			3
Spring Junior: Stony Brook				
MEC 262: Engineering Dynamics	R		3	
MEC 363: Mechanics of Solids	R		3	
AMS 361: Applied Calculus IV: Differential Equations	R[(b)]	4		
GLO & DIV (SBC: Engage Global and Diversity Issues)	R[(c)]			6
Fall Junior: SUNY Korea				
MEC 226: Modern Machining Practices	R		1	
MEC 301: Thermodynamics	R		3	
MEC 310: Introduction to Machine Design	R		3(√)	
MEC 316: Instrumentation and Solid Mechanics Laboratory	R		2(√)	
MEC 320: Numerical Methods in Eng. Design and Analysis	R		3	
MEC 325: Manufacturing Processes	R		3	
MEC 364: Introduction to Fluid Mechanics	R		3	
Spring Senior: SUNY Korea				
MEC 300: Technical Communication in Mech. Eng. (WRTD)	R		2	
MEC 305: Heat and Mass Transfer	R		3	
MEC 317: Thermal Sciences and Fluid Mechanics Laboratory	R		2	
MEC 410: Design of Machine Elements	R		3(√)	
MEC 411: Control System Analysis and Design	R		4(√)	
MEC 440: Mechanical Engineering Design I	R		3(√)	
Technical Elective #1	SE		3	
Fall Senior: SUNY Korea				
MEC 441: Mechanical Engineering Design II	R		3(√)	
MEC 422: Thermal System Design	R		3(√)	
ESG 332: Materials Science I: Structure and Prop. of Materials	R		3	
Technical Elective #2 – MEC 450, 402, 455, 456	R		3	
Technical Elective #3	R		3	
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		32	73	23
PERCENT OF TOTAL		%26	%56	%18
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM			128	
Total must satisfy either credit hours or percentage	Minimum Semester Credit Hours	32 Hours	48 Hours	
	Minimum Percentage	%24	%36	

(a) ITS 101 and ITS 102 are First-Year Seminar courses required by all Freshman students and replaceable by 101/102 courses with designations ACH, GLS, HDV, LDS, or SSO. Transfer students take ADV 101 instead of ITS 101 and are not required to take ITS 102.
(b) This course may be replaced by one or more courses with a similar title, per Graduation Requirement detailed in Criterion 1.
(c) DIV requirement applies to student admitted or re-matriculated after Fall 2019

Table 3: Pre-requisite Flow Chart of Mechanical Engineering Curriculum



[Mechanical Engineering] Undergraduate Graduation Clearance Form

(updated on August 23, 2023)

Name: ID:				Graduation Term:
REQUIREMENT	GRADE	T(transfer)/W(waived)	GPA	NOTES
EST 392(3) or ECO 108(4)				
AMS 151(3) or MAT 131(4)				C or higher
AMS 161(3) or MAT 132(4)				D or higher
AMS 210 or MAT 211 (3)				D or higher
AMS 261 or MAT 203 (4)				D or higher
AMS 361 or MAT 303 (4)				D or higher
WRT 101 (3)				C or higher
WRT 102 (3)				
PHY 131/133 (4)				C or higher
PHY 132/134 (4)				C or higher
ESG 198(3) or CHE 131(4)				
Basic Science Elective (4)				
ESG 332 (3)				
MEC 101 (3)				C or higher
MEC 102 (2)				
MEC 203 (3)				
MEC 220 (3) - SBU				
MEC 225 or 226 (1)				
MEC 260 (3) - SBU				C or higher
MEC 262 (3) - SBU				C or higher
MEC 300 (2)				
MEC 301 (3)				
MEC 305 (3)				
MEC 310 (3)				
MEC 316 (2)				
MEC 317 (2)				
MEC 320 (3)				
MEC 325 (3)				
MEC 363 (3) - SBU				C or higher
MEC 364 (3)				
MEC 410 (3)				
MEC 411 (4)				
MEC 422 (3)				
MEC 440 (3)				
MEC 441 (3)				C or higher
Technical Elective 1 (3)				
Technical Elective 2 (3)				
Technical Elective 3 (3)				
Earned Credits	/128			
Major GPA	/4			
Overall GPA	/4			
SBC Courses				Need: WRT, QPS, SNW, TECH, SNW, SBS, USA, STAS, GLO, HUM, ARTS, DIV

Table 3b: Graduation clearance form.

(for students entering the program from Spring 2016 to present)

NAME: BLANK, STUDENT (MAT LVL 5) ID: 100000005			DEGREE STATUS: INCOMPLETE		
	REQUIREMENT	**GRADE**	**T/Wvr**	**GPA**	**NOTES**
×	EST 392 or ECO 108 (3)				
×	MAT 131 or AMS 151 (3)				
×	MAT 132 or AMS 161 (3)				
×	MAT 211 or AMS 210 (3)				
×	MAT 203 or AMS 261 (4)				
×	MAT 303 or AMS 361 (4)				
×	PHY 131/133 (4)				
×	PHY 132/134 (4)				
×	CHE 131 (4)				
×	Basic Science Elective (3)				
×	ESG 332 (3)				
×	MEC 101 (3)				
×	MEC 102 (2)				
×	MEC 203 (3)				
×	MEC 214 (1)				
×	MEC 220 or ESE 271 (3)				
×	MEC 225 (1)				
×	MEC 260 (3)				
×	MEC 262 (3)				
×	MEC 300 (1)				
×	MEC 301 (3)				
×	MEC 305 (3)				
×	MEC 310 (3)				
×	MEC 316 (2)				
×	MEC 317 (2)				
×	MEC 320 (3)				
×	MEC 325 (3)				
×	MEC 363 (3)				
×	MEC 364 (3)				
×	MEC 410 (3)				
×	MEC 411 (4)				
×	MEC 422 (3)				
×	MEC 440 (3)				
×	MEC 441 (3)				
×	TE 1 (3)				
×	TE 2 (3)				
×	TE 3 (3)				
✓	Major GPA	...		...	
✓	UG GPA	...		...	
×	SBC Courses (verify with CEAS; not accurate for Honors College plan)				Need: WRT,HUM,QPS,SNW,TECH,SBS,USA,STAS,GLO,ARTS

Advising for Course Registration
Every mechanical engineering student will be assigned an academic advisor who is a member of the mechanical engineering faculty. The Department will schedule two Advising Weeks before the preregistration period of each semester. Students are required to obtain the advisor's approval before registering for mechanical engineering courses for the following semester.

Grading
All courses taken to satisfy requirements 1 through 9 above must be taken for a letter grade. No courses fulfilling the major requirements for the B.E. in Mechanical Engineering may be taken on a Pass/No Credits basis.

In addition, the grade point average for all MEC courses and all technical electives must be at least 2.0. When a course is repeated, the higher grade will be used in calculating this average. A minimum grade of "C" in MEC 260, MEC 262, and MEC 441 is required for the BE degree. Note: In order to satisfy prerequisites for certain required courses, grades of "C" or higher are needed in the following courses: PHY 131 or PHY 125, MAT 131 or MAT 125, and MEC 101.

Minimum Grades
Starting in Fall 2010, the following minimum grades will be required in the following courses before being allowed to move onward:

- A grade of *C* or higher must be obtained in MEC 101 in order to take MEC 102.
- A grade of *C* or higher must be obtained in MEC 260 and MEC 262 in order to graduate.
- A grade of *C* or higher must be obtained in MEC 260 in order to take MEC 262 and MEC 363.

Starting in Fall 2014, the following additional minimum grades will be required:

- A grade of C or higher must be obtained in MEC 441 in order to graduate
- A grade of C or higher must be obtained in MEC 262 in order to take MEC 310
- A grade of C or higher must be obtained in MEC 363 in order to take MEC 316

Note also that the Physics and Mathematics departments have minimum grade requirements for their courses, including those required for Mechanical Engineering. Grades of "C" or higher are needed in the following courses: PHY 131 or PHY 125, MAT 131 or MAT 125. Please check with these departments for details.

Undergraduate Research
Students with a superior academic record (a G.P.A of 3.0 or better) may use MEC 499 (3 credits) for an independent research study under the guidance of a Mechanical Engineering faculty member. Additional details may be found in the course description. The department has several research laboratories; a description of these laboratories can be found in the Graduate Bulletin. This course must be taken at Stony Brook.

Graduate Courses
Graduate level courses may be taken by undergraduate students with a superior academic record and may be counted as technical electives. Approval must be obtained from the Department of Mechanical Engineering Undergraduate Program Director, the course instructor, and the Graduate School.

College Residence Requirement
In addition to course requirements for a B.E. degree in mechanical engineering, students must meet the Residence Requirement of the College of Engineering and Applied Science (CEAS) as follows.

At least seven engineering courses (those with the designator BME, MEC, ESE, ESG, or ESM) and/or approved technical elective courses must be completed in CEAS at Stony Brook At least five of the seven courses must be taken in the Department of Mechanical Engineering. In addition, the following courses may not be used to meet the above requirement: MEC 300; MEC 316, 317; MEC 440, and 441. Similar courses (laboratories and senior design) in other departments of CEAS also may not be used to meet the requirement.

College Time Limits for the B.E. Degree
All requirements for the Bachelor of Engineering degree must be met in eleven semesters by those students with full-time status. Full-time transfer students must meet all degree requirements in the number of semesters remaining after the number of transferred degree-related credits are divided by 12 (the semester equivalency) and the result is subtracted from 11 (semesters). In addition, students who withdraw from the University and return at a later date to complete degree requirements are required to have formally re-evaluated all courses more than six years old that were taken at Stony Brook or elsewhere to fulfill major requirements.

University Graduation Requirements
In addition to the above requirements a student should check that he or she has met all additional requirements set forth by the University.

Allowed Calculators
Effective spring, 2010 only the following calculators will be permitted to be used on all midterm and final exams in the Department of Mechanical Engineering. There will be no exceptions! This list of calculators is identical to that allowed for the *National Council for Examiners for Engineering and Surveying* (NCEES) Fundamentals of Engineering (FE) exam that many of you will take in your senior year, as well as the Professional Engineering (PE)exam that you may take several years from now. The sooner you become comfortable on one of these calculators, the better.

NCEES Allowed calculators as of spring, 2010:

- Casio: All **fx-115** models. Any Casio calculator must contain fx-115 in its model name.
- Hewlett Packard: The **HP 33s** and **HP 35s** models, but no others.
- Texas Instruments: All **TI-30X** and **TI-36X** models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.

The NCEES policy on calculators can be found here: http://ncees.org/exams/calculator-policy/ .

The Accelerated BE/MS Program in Mechanical Engineering

The accelerated BE/MS program in mechanical engineering allows students to use up to 9 graduate credits taken as an undergraduate towards both BE and MS degree requirements, thus reducing the normal time required to complete both degrees. The program is designed for upper-division mechanical engineering students with superior academic records (GPA > 3.1). For detailed program requirements including admission requirements, please contact the Graduate Program Director.

Minor in Mechanical Engineering

The minor in mechanical engineering is offered for students who want the record of their University studies to show a significant amount of upper-division work in the discipline. Entry into this minor presupposes a background in mathematics and physics, represented by the prerequisite requirements for the courses listed below.

Requirements for the Minor in Mechanical Engineering (MEC)
Completion of the minor requires 18-20 credits, of which 12-13 are from required courses and 6-7 from electives. A student who wishes to pursue this minor should consult with the undergraduate program director in the Department of Mechanical Engineering before registering for the elective courses. All courses must be taken for a letter grade and a G.P.A. of **2.0** or higher is required for the six courses that constitute the minor**.**

1. **Four required courses**:
    - MEC 260 Engineering Statics
    - MEC 262 Engineering Dynamics
    - MEC 301 Thermodynamics
      or ESG 302 Thermodynamics of Materials
    - MEC 363 Mechanics of Solids

2. **Two elective courses chosen from the following**:
    - MEC 305 Heat and Mass Transfer
    - MEC 310 Introduction to Machine Design
    - MEC 320 Engineering Design Methodology and Optimization
    - MEC 325 Manufacturing Processes and Machining (requires MEC 225 also)
    - MEC 364 Introduction to Fluid Mechanics
    - MEC 393 Engineering Fluid Mechanics
    - MEC 398 Thermodynamics II
    - MEC 402 Mechanical Vibrations
    - MEC 411 System Dynamics and Control
    - MEC 491, 492 Topics in Mechanical Engineering
    - MEC 455: Applied Stress Analysis

Note that *all* pre- and co-requisites for a course must be met in order to be eligible to register for it. Other electives require approval of the undergraduate programdirector.

Minor in Engineering Composites

The Department of Mechanical Engineering offers the minor in Engineering Composites to Mechanical Engineering students and non-Mechanical Engineering students who seek a strong education in the mechanical behavior of composite materials. This major is intended for students with a strong background in engineering or physical science. Engineering composites are used widely in many industries including aerospace, civil, naval, medical, and automotive; examples can be seen in aircraft, yachts, motor vehicles, dental fillings and a wide range of militaryequipment. Engineering composites can be designed with high stiffness, high strength and lightweight, making them efficient as structural load bearing components. They constitute an extremely broad and versatile class of materials that encompass a wide range of constituents, length scales and configurations. Examples include fiber reinforced polymer composites, metal matrix composites, particle reinforced composites, nano-reinforced composites. Composites are inherently more complex than monolithic engineering materials that students are used to (e.g. metals and ceramics). They are heterogeneous, anisotropic and predicting their mechanical behavior and failure is far more challenging than that of conventional structural materials. In comparison to conventional materials, designing with composites admits tremendous possibility, but requires specialized analysis methods. This minor will provide the students with the background as well as the analysis and design methods to provide a foundation for using engineering composites effectively. To fulfill this outcome, three main topics will be addressed: 1) Theoretical background, analysis and design; 2) Fabrication; and 3) Characterization. Students will learn how to fabricate composites, experimentally measure their relevant mechanical properties, and incorporate them into engineering designs. Students will gain invaluable insight into engineering composites, give them a competitive edge in an engineering market that is becoming increasingly dependent on engineering composites.

Requirements for the Minor in Engineering Composites

Completion of the minor requires 18-21 credits from the following 3 required and 3 elective courses. Please note that all prerequisites must be satisfied in order to take these courses. A student who wishes to pursue this minor should consult with the undergraduate program director in theDepartment of Mechanical Engineering before registering for the elective courses. All coursesmust be taken for a letter grade and a G.P.A. of 2.0 or higher is required for the six-seven courses that constitute the minor**.**

1. Three Required Courses (9 credits)
    - MEC 363: Mechanics of Solids
    - MEC 456: Intro to Engineering Mechanics of Composites
    - MEC 457: Engineering Composites Fabrication and Characterization
2. Three Elective Courses from the following list (9 to 12 credits):
    - MEC 455: Applied Stress Analysis
    - MEC 442: Introduction to Experimental Stress Analysis
    - ESG 302: Thermodynamics of Materials
    - ESG 332: Materials Science I (Cannot be used by MEC, ESG, and CIV majors)
    - ESM335: Strength of Materials
    - ESM 369: Polymer Engineering
    - BME 353 or ESM 353: Biomaterials: Manuf, Prop, and Appl

Mechanical Engineering Course Descriptions

Introduction to the engineering experience in general and mechanical engineering in particular through lectures by faculty and invited speakers from industry, field trips, films and laboratory demonstrations. Lectures cover creative thinking and problem-solving, design team work, computer utilization, engineering ethics and legal issues, use of libraries and other sources of information, career opportunities in mechanical engineering and related fields, emerging technologies and the cross-disciplinary nature of engineering.

3 credits

MEC 101: Freshman Design Innovation

This course presents an overview of the mechanical engineering profession, engineering ethics, basics of computation via correct usage of dimensions, units, and significant digits, and engineering documentation. Furthermore, this course introduces the students to the process of engineering design and provides a project-based design experience wherein the students design, build, and program a microcontroller driven autonomous mechatronic device. In doing so, they are provided an early exposure to the systematic approach to engineering problem solving that brings together fundamental concepts of forces, motions, energy, materials, manufacturing processes, and machines and mechanisms from mechanical engineering and basic electronics, sensing, actuation, and computer programming. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Pre- or co-requisites: AMS 151 or MAT 125 or MAT 131 or MAT 141 or MPE level 6 or greater and PHY 125 or PHY 131 or PHY 141

3 credits

MEC 102: Engineering Computing and Problem Solving

Introduction to programming with MATLAB. Control structures, arrays and matrix operations, functions, object-oriented programming, interfacing MATLAB with other languages. Projects includes applications in solid mechanics, fluid mechanics, thermodynamics and heat transfer, control theory, and basic design concepts. Emphasizes the interpretation of previous analysis in terms of generating results, making quantitative comparisons, and assessing changes that optimize or otherwise maximize the usefulness of the result.

Prerequisite: Level 3 or higher on the mathematics placement examination

2 credits

MEC 104: Practical Science of Things

A practical introduction to the science and engineering of objects and phenomena in everyday life. The basic principles that underlie the operation common to modern devices such as rollercoasters, balloons, vacuum cleaners, airplanes, bicycles, thermostats, air conditioners and automobiles are developed by investigating how they work. The scientific method, engineering design methodology, safety, and environmental impacts are discussed in the context of these practical applications.

Prerequisite: Satisfaction of entry skill in mathematics requirement (Skill 1) or satisfactory completion of D.E.C. C or QPS

DEC: E
SBC: SNW, TECH

3 credits

MEC 105: Everyday Science and Engineering

A practical introduction to the science and engineering of objects and phenomena in everyday life. The basic principles that underlie the operation common to modern devices such as xerographic copiers, tape recorders, computers, microwaves, lasers, CDs, plastics, nuclear weapons, and magnetic resonance imaging (MRI) are developed by investigating how they work. The scientific method, engineering design methodology, safety, and environmental impacts are discussed in the context of these practical applications.

Prerequisite: Satisfaction of entry skill in mathematics requirement (Skill 1) or satisfactory completion of D.E.C. C or QPS

DEC: E
SBC: SNW, TECH

3 credits

MEC 203: Engineering Graphics and CAD

Introduces engineering graphics and its role in design process. Includes the principles of engineering drawing and sketching for mechanical design, the use of computer graphics and solid modeling in design representation of 3D objects, assembly and simulation as well as ASME standards on geometric dimensioning and tolerances. Includes hands-on experience in the use of CAD software packages for engineering design. Engineering ethics.

3 credits

MEC 220: Practical Electronics for Mechanical Engineers

An overview of basic electronics at the practical level. The course provides mechanical engineering students with the fundamentals to perform basic electronics work needed in laboratories, subsequent courses and their professional careers. Topics include both passive and active components, AC and DC circuits, and a focus on operational amplifier and transistor driven circuits needed for instrumentation and control. Hands-on work in each area complements theoretical analysis, and ensures that students can implement these circuits and devices practically; students will analyze and build circuits both from circuit diagrams, as well as from product datasheets.

Prerequisites: PHY127, PHY132, or PHY142

3 credits

MEC 225: Fundamentals of Machining Practices

Hands-on experience in the fundamentals of machining including metrology tools and devices, saw, sheet metal working, drilling, reaming, taping, turning, boring, milling, and welding. Not for credit in addition to MEC 226. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Pre- or Co-requisite: MEC 203

Prerequisite: MEC major or permission of instructor

1 credit

MEC 226: Modern Machining Practices

Hands-on experience in automated machining including additive and subtractive processes, such as fused deposition modeling (FDM) rapid prototyping, and computer numerical control (CNC) multi-axis machining. Not for credit in addition to MEC 225. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Pre- or Co-requisite: MEC 203

Prerequisite: MEC major or permission of instructor

1 credit

MEC 260: Engineering Statics

A review of vector algebra. Concept of force. Equilibrium of particles. Moments about points and lines, couples and equivalent force systems. Equilibrium of rigid bodies. Analysis of simple structures such as trusses, frames, and beams. Centroids, centers of gravity, and moments of

inertia. Dry friction with applications to wedges, screws, and belts. Method of virtual work, potential energy, and stability.

Prerequisite: PHY 131 or 141 or 125

Corequisite: AMS 261 or MAT 203

3 credits

MEC 262: Engineering Dynamics

Vectorial kinematics of particles in space, orthogonal coordinate systems. Relative and constrained motions of particles. Dynamics of particles and the systems of particles, equations of motion, energy and momentum methods. Collisions. Two- and three-dimensional kinematics and dynamics of rigid bodies. Moving frames and relative motion. Free, forced, and damped vibrations of particles and rigid bodies.

Prerequisite: A grade of "C" or better in MEC 260

3 credits

MEC 280: Pollution and Human Health

An examination of major environmental pollution problems such electromagnetic radiation, ozone layer depletion, and global warming, with a specific focus on the resulting effects on human health. Assessment of health risks in relation to the formulation of environmental and workplace regulations is also considered.

Prerequisite: one D.E.C. E or SNW course

DEC: H
SBC: STAS

3 credits

MEC 300: Professional Conduct for Engineers

The study of ethical decisions confronting individuals and organizations in engineering and science. Related questions about moral conduct, character, ideals and relationships of people and organizations involved in technical development are discussed. Ethics codes for engineers, computer scientists, and natural scientists are covered. The interaction of engineers, their technology, the society and the environment is examined using case studies. Includes topics in law such as negotiation, reverse engineering, ownership and enforcement of intellectual property, and export controls. Introduction to patents and patent infringement using case studies.

Prerequisites: WRT 102; MEC Major; U3 or U4

2 credits

MEC 301: Thermodynamics

Variables that describe the thermodynamic state of a system or control volume, including absolute temperature, internal energy, enthalpy, and entropy are introduced, and basic principles governing the transformations of energy, especially heat and work, are developed. Underlying principles are used to analyze and solve problems related to thermodynamic systems and to determine the changes in properties of the systems and surroundings implied by changes in inputs, configuration, or constraints.

Prerequisites: AMS 261 or MAT 203; PHY 125 or 131 or 141; CHE 131; MEC Major

3 credits

MEC 305: Heat and Mass Transfer

The fundamental laws of momentum, heat and mass transfer, and the corresponding transport coefficients. Principles of steady-state and transient heat conduction in solids are investigated. Laminar and turbulent boundary layer flows are treated, as well as thermal radiation, and radiation heat transfer between surfaces. Applications to heat transfer equipment are covered throughout the course.

Prerequisites: MEC 301 and 364; MEC 102, or ESG 111, or ESE 124, or CSE 114 or 130 or BME 120

3 credits

MEC 310: Introduction to Machine Design

Application of graphical and analytical methods to the analysis and synthesis of mechanism. Covers concepts of degrees of freedom, graphical and analytical linkage synthesis, position, velocity, acceleration, and force analysis of linkage mechanisms. Introduces principles behind the operation of various machine elements such as gears and gear trains, cams, flywheels and their design, and analysis techniques.

Prerequisites: MEC 102 or CSE 114 or 130 or ESG 111 or BME 120 or ESE 124; C or better in MEC 262 (or BME 260 for BME majors)

Pre- or Corequisite: MEC 203 (ESG 316 for ESG majors)

3 credits

MEC 316: Instrumentation and Solid Mechanics Laboratory

Hands-on experience in solid mechanics and instrumentation with focus on the concept of static and dynamic response. Students learn to operate instruments for measuring displacement, angle, acceleration, and strain. Student groups perform a series of experiments to probe the spatial and temporal resolution of modern instrumentation and sensors in relation with fundamental material properties. Lectures at the beginning of the course provide background information and theories of experimentation. Not to be taken in the same semester as MEC 317. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: MEC major; C or better in MEC 363; PHY 134

Corequisites: MEC 220; MEC 300; AMS 361 or MAT 303

SBC: TECH

2 credits

MEC 317: Thermal Sciences and Fluid Mechanics Laboratory

Hands-on experience in fluid mechanics, heat transfer, and thermodynamics. Introduction to a variety of sensors and instruments commonly used in mechanical engineering with focus on temperature, pressure, and flow velocity measurements. Student groups perform a series of experiments with emphasis on the understanding of fundamental principles as well as familiarity with modern experimentation. Lectures provide background information and theories of experimentation. Not to be taken in the same semester as MEC 316. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: MEC major; PHY 134; U3 or U4 standing

Corequisite: MEC 220; MEC 300; MEC 301; MEC 364; AMS 361 or MAT 303

SBC: TECH

2 credits

MEC 320: Numerical Methods in Engineering Design and Analysis

This course emphasizes the implementation of numerical methods for computer-aided solutions to the problems that arise in engineering design and analysis. Methods include interpolation, extrapolation, curve fitting, and integration and techniques solving non-linear equations, systems of linear equations, and differential equations. Optimization in engineering design is covered from the formulation of design specifications and criteria, to analyzable models, through to numerical implementation.

Prerequisites: MEC 102 or CSE 114 or CSE 130 or ESG 111 or ESE 124 or BME 120; AMS 261 or MAT 203; AMS 361 or MAT 303

3 credits

MEC 325: Manufacturing Processes

The relationship between product design and manufacturing. Materials properties and influence. Introduces traditional and nontraditional manufacturing processes and their capabilities and limitations. Measurement inspection, reliability, and quality engineering. Economic impact of modern process engineering.

Pre- or Corequisite: MEC 203

Prerequisite: MEC major or permission of the department

3 credits

MEC 363: Mechanics of Solids

Stress and deformation of engineering structures and the influence of the mechanical behavior of materials. Concepts of stress and strain, constitutive relations, analysis of statically indeterminate systems, study of simple bars and beams, and stability conditions. Emphasis on force equilibrium, elastic response of materials, geometric compatibility, Mohr's circle, stresses and deflections in beams, and torsion and buckling of rods. Design for bending, shear, and combined states of stress.

Prerequisite: A grade of "C" or better in MEC 260 or BME 260

3 credits

MEC 364: Introduction to Fluid Mechanics

Fundamental properties of fluids and their conservation laws with applications to the design and evaluation of flows of engineering interest. Topics include hydrostatics, surface tension, dimensional analysis and dynamic similitude, Euler's equation, rotating coordinate systems, boundary layers, lubrication, drag on immersed bodies, open channel and pipe flows, and turbomachinery.

Prerequisite: PHY 126 or PHY 131; MEC 262; MEC Major

3 credits

MEC 393: Engineering Fluid Mechanics

The application of the principles of fluid mechanics to important areas of engineering practice such as turbomachinery, hydraulics, and wave propagation. Prepares students for advanced

coursework in fluid dynamics. Extends the study of viscous effects, compressibility, and inertia begun in MEC 364.

Prerequisite: MEC 364

3 credits

MEC 398: Thermodynamics II

Psychrometrics and psychrometric charts. Thermodynamic considerations for the design and performance of cooling towers, humidifiers, and dehumidifiers. Reacting mixtures, combustion, and chemical equilibrium. Thermodynamics of fluid flow, simple compression, and expansion processes. Analysis and design of gas and vapor power cycles. Cycles with reheat, intercooling, and cogeneration plants. Refrigeration cycles.

Prerequisites: MEC 301 and 364

3 credits

MEC 402: Mechanical Vibrations

Modeling, analysis and design for mechanical vibrations. Fundamentals of free vibration, harmonically excited vibration and vibration under general forcing conditions are considered for one degree, two degree and multidegree of freedom systems; continuous systems; vibration design strategies including isolation and absorbers.

Prerequisites: MEC 262 and 363

3 credits

MEC 410: Design of Machine Elements

Application of analytical methods, material science, and mechanics to problems in design and analysis of machine components. Includes the design of mechanical components such as bearings, gears, shafting, springs, fasteners, belts, clutches, and brakes, and takes into consideration factors such as manufacturability and reliability. Design projects with open-ended and interactive problems are assigned to integrate several machine elements in a system.

Prerequisites: MEC 310 and 363

3 credits

MEC 411: Control System Analysis and Design

Analysis and design of feedback control systems. Topics include system modeling; transfer function; block diagram and signal-flow graph; sensors, actuators, and control circuit design; control system characteristics and performance; stability analysis; root locus method; Bode diagram; PID and lead-lag compensator design.

Prerequisites: MEC 220; MEC 262; AMS 361 or MAT 303

4 credits

MEC 422: Thermal System Design

Device design and system design. Quantitative data for system design including operating characteristics of compressors, turbines, heat exchangers, piping systems, internal combustion engines, and other component equipment. Component matching and system simulation. Optimization including thermoeconomic evaluation and energy analysis. Case studies: refrigeration and air conditioning systems, combined cycles, steam-injected gas turbines.

Prerequisite: MEC 305

3 credits

MEC 423: Internal Combustion Engines

Introduction to internal combustion engines and their operation. Analytical approach to the engineering problem and performance analysis of internal combustion engines. Topics include thermodynamics fundamentals; fuel-air cycle analysis; engine combustion; emission formation and control strategies. Includes both the relevant fundamental concepts and the extensive practical knowledge base on which engine research, development, and design depend. Not for credit in addition to MEC 523.

Prerequisite: MEC 305

3 credits

MEC 440: Mechanical Engineering Design I

Part I of the two-semester capstone design project sequence. Senior students select a project with multiple realistic constraints, develop the necessary technical background, and write a proposal, progress reports, and a preliminary design report. Includes an oral presentation on the development and progress of the project. Not counted as a technical elective. The final grade will be assigned at the end of the two course sequence MEC 440-MEC 441. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: MEC 225 or 226; MEC 310; MEC 320 and 325; MEC major; U4 standing

Corequisites: MEC 300; MEC 316; MEC 317; MEC 410 and 411

Partially fulfills: CER, ESI, EXP+, SBS+, SPK, STEM+, WRTD

3 credits

MEC 441: Mechanical Engineering Design II

Part II of the two-semester capstone design project sequence. Students complete the project design, incorporating engineering standards, build and test a prototype, write a mid-term report and a final design report, and give an oral presentation. Not counted as a technical elective. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: MEC 440

Partially fulfills: CER, ESI, EXP+, SBS+, SPK, STEM+, WRTD

3 credits

MEC 442: Introduction to Experimental Stress Analysis

The concepts of three-dimensional stress and strain, their transformation laws, and their mutual relationships are discussed in detail. Results from theory of elasticity as pertinent to experimental stress analysis are also presented. Experimental techniques studied include two-dimensional photoelasticity, resistance strain gauge, moire method, brittle coating, and analog methods. The application of different techniques to the measurement of stress and strain in models as well as actual structures is demonstrated. Students form small groups and each group is assigned different laboratory projects to gain experience in various experimental stress analysis methods. Previously offered as MEC 342.

Prerequisite: MEC 363

3 credits

MEC 450: Mechatronics

An introduction to the design, modeling, analysis, and control of mechatronic systems (smart systems comprising mechanical, electrical, and software components). Fundamentals of the basic components needed for the design and control of mechatronic systems, including sensors, actuators, data acquisition systems, microprocessors, programmable logic controllers, and I/O systems, are covered. Hands-on experience in designing and building practical mechatronic systems is provided through integrated lab activities.

Prerequisites: MEC 310; 316

Corequisite: MEC 411

3 credits

MEC 455: Applied Stress Analysis

A study of linear elastic solids with emphasis on internal stress analysis. Simple boundary value problems at plane structures are analyzed with various solution techniques. Major topics are stress and strain tensors, linear elasticity, principle of virtual work, torsion, stress functions, stress concentration, elementary fracture, and plasticity.

Prerequisite: MEC 363

3 credits

MEC 456: Introduction to Engineering Mechanics of Composites

Introduction to the engineering mechanics of fiber reinforced composites. Brief history of the development of fiber composites, their properties, advantages, limitations and applications. Overview of the different types of composites but with focus on long fiber reinforced composites; particularly, lamina and laminate concepts characteristics and configurations. Topics covered include: elastic properties of unidirectional lamina, strength of unidirectional lamina, elastic behavior of multidirectional laminates and stress and failure of multidirectional laminates. Design methodologies and considerations for structural composite materials.

Prerequisite: MEC 363

3 credits

MEC 457: Engineering Composites Fabrication and Characterization

Overview of fiber reinforced composites, applications and mechanical properties. Introduction to fiber composites fabrication methods as well as experimental characterization methods used in acquiring their relevant mechanical properties. Fabrication topics include: impregnation of fibers; prepregs; stacking; curing; vacuum bagging; autoclave technology; out-of-autoclave manufacturing processes; molding; processing; cutting and joining. Topics in mechanical characterization include: experimental methods; characterization of the elastic properties and failure strengths of unidirectional lamina; characterization of the elastic properties and failure strengths of multidirectional laminates. Course is divided into in-class lectures and laboratory sessions.

Prerequisite: MEC 363

3 credits

MEC 464: Fundamentals of Aerodynamics

Kinematics and dynamics of incompressible irrotational flow; stream function and the potential function; Euler and Bernoulli equations. Thin-foil theory; lift and moment for symmetric and cambered airfoils. Finite-wing theory; induced drag. Compressible flow, small-disturbance theory; thin wings at subsonic and supersonic speeds.

Prerequisites: MEC 305; MEC 310; MEC 364

3 credits

MEC 465: Aerospace Propulsion

Fundamentals of propulsion; performance parameters, thermodynamic cycles. Introduction to combustion and combustors. Performance and cycle analysis of various flight propulsion systems: turbojets, turbofans, turboprops, ramjets, scramjets, rockets and propellors. Design of supersonic inlet nozzles, component matching and map.

Prerequisites: MEC 305; MEC 310; MEC 364

3 credits

MEC 470: Introduction to Tribology

Focus is on the fundamentals of tribology, the science of surfaces in relative motion, with an introduction to friction, lubrication, and wear. The basics of tribology science: engineering surfaces, contact mechanics, lubrication theory, wear processes and modeling, wear properties of materials, and tribology test methods will be covered. Analysis of tribological aspects of machine components and bearings. Industrial case studies will be presented to place the topics in context to industry and society.

Prerequisites: MEC 363 and 364

3 credits

MEC 475: Undergraduate Teaching Practicum

Students assist the faculty in teaching by conducting recitation or laboratory sections that supplement a lecture course. The student receives regularly scheduled supervision from the faculty instructor. May be used as an open elective only and repeated once.

Prerequisites: U4 standing; a minimum g.p.a. of 3.00 in all Stony Brook courses and the grade of B or better in the course in which the student is to assist; permission of department

SBC: EXP+

3 credits

MEC 488: Mechanical Engineering Internship

Participation in off-campus engineering practice. Students are required to submit a proposal to the department at the time of registration and two term reports before the end of the semester. May be repeated up to a limit of 12 credits.

Prerequisite: Permission of undergraduate program director

SBC: EXP+

3-9 credits, S/U grading

MEC 491: Topics in Mechanical Engineering

Treatment of an area of mechanical engineering that expands upon the undergraduate curriculum. Topics may include advanced material in a specialty, development of a specialized experimental technique, or a specific area of design. Topics may vary from semester to semester. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as the topic changes.

Prerequisite: U3 or U4 standing in a B.E. degree major; permission of department (course prerequisites vary with topic)

1-4 credits

MEC 492: Topics in Mechanical Engineering

Treatment of an area of mechanical engineering that expands upon the undergraduate curriculum. Topics may include advanced material in a specialty, development of a specialized experimental technique, or a specific area of design. Topics may vary from semester to semester. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as the topic changes.

Prerequisite: U3 or U4 standing in a B.E. degree major; permission of department (course prerequisites vary with topic)

1-4 credits

MEC 495: Professional Engineering Seminar

Prepares the student to enter the workplace as a practicing engineer. Topics include professional ethics, professional activities, professional engineering licensing, patents, seeking entry-level employment, and exposure to the engineering work environment. Aids in preparation for the

EIT/FE exam. Includes speakers from a variety of disciplines, within the College and from industry.

Prerequisites: CEAS major; U4 standing

1 credit, S/U grading

MEC 499: Research in Mechanical Engineering

An independent research project under the supervision of a mechanical engineering faculty member. Permission to register requires the agreement of the faculty member to supervise the research and submission of a one-page research proposal. May be repeated but only six credits of research electives may be counted as technical electives.

Prerequisites: U3 or U4 standing; permission of department

0-3 credits

Staff
Department of Mechanical Engineering

LEE, Hyunsong	B619
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Lab Safety

Students working in a research laboratory can take a two-part training class, offered by Environmental Health and Safety. Students using ionizing radiation and lasers should take an additional class. The classes are offered in the fall, spring, and summer. Please contact your advising professor for details on these classes and when and where they are off

Important Campus Phone Numbers

DEPARTMENT OF MECHANICAL ENGINEERING	032-626-1801
ACADEMIC TEAM	032-626-1122
STUDENT SERVICES & CAREER TEAM	032-626-1195
THE WRITING CENTER	032-626-1143/1177
IGC HOUSING OFFICE	032-626-4856
IGC CENTRAL LIRARY	032-626-0251