Undergraduate Guide to the Mechanical Engineering Department

Revision A (Spring 2008)

Chair:	**Fu-pen Chiang, SUNY Distinguished Professor** 105 Light Engineering 631 632-8311 fchiang@notes.cc.sunysb.edu
Deputy Chair:	**Q. Jeffrey Ge, Professor** 113 Light Engineering 631 632-8305 Qiaode.Ge@stonybrook.edu
Undergraduate Program Director:	**Jon P. Longtin, Associate Professor** 107 Light Engineering 631 632-1110 jlongtin@ms.cc.sunysb.edu
Asst. to Chair:	**Melissa L. Castelbuono** 109 Light Engineering 631 632-8300 Melissa.Castelbuono@stonybrook.edu
Undergraduate Secretary:	**Vaughn Lombardo** 113 Light Engineering 631 632-8310 vlombar@notes.cc.sunysb.edu
FAX number:	631 632–8544
Website:	**http://me.eng.sunysb.edu**

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What's New in Revision A

Our curriculum, university requirements and procedures, and this guide itself change from time to time. A summary of the major changes is included here for people who have been using older versions of the guide.

Major changes in this edition:

- Revised format and organization for easier information, fixed minor errata.
- Course changes (see **Mechanical Engineering Course Descriptions** on page 21):
  - MEC 214 – *Probability and Statistics* added
  - MEC 326 – *Manufacturing Processes* split into MEC 325 (lecture) + MEC 125 (lab)
- The Department has implemented a calculator policy. See ***New!*** *Allowed Calculators* on page 18.
- Minimum grade requirements for MEC 260, MEC 262, and MEC 363. See ***New!*** *Minimum Grades* on page 17.

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 *What's New* section for a quick summary of Departmental and Curriculum changes.

Additional Resources

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

http://me.eng.sunysb.edu

In addition, a list of Frequently Asked Questions and other resources are available on the website.

Mission Statement

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, a significant 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 undergraduate 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.

Educational Objectives

1. The educational objectives of our mechanical engineering program are to prepare our graduates to Establish a successful career in mechanical engineering or related fields in industry and other organizations where an engineering approach to problem solving is highly valued.
2. Contribute significantly in multidisciplinary work environment with high ethical standards and with an understanding of the role of engineering in the economy and the environment.
3. Excel in graduate study and research, reaching advanced degrees in engineering and related disciplines.
4. Achieve success in professional development through life-long learning.

Curriculum Overview

The undergraduate mechanical engineering curriculum includes the Diversified Educational Curriculum (DEC) 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 and fluid mechanics, mechanical design, solid mechanics, and the dynamic behavior and control of mechanical 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 instrumentation and 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.

Program Outcomes

All of the aforementioned curricular activities are carefully integrated so that students, upon graduation, are expected to have:

1. The ability to apply knowledge of mathematics, science, and engineering to mechanical engineering problems;
2. The ability to design and conduct experiments and to analyze and interpret data;
3. The ability to work professionally in both the thermal and mechanical systems areas including the design and realization of such systems to meet desired needs;
4. The ability to identify, formulate, and solve engineering problems;
5. The ability to function as a member of multidisciplinary teams;
6. A solid understanding of professional and ethical responsibility;
7. An ability to communicate effectively in written, oral, and visual form;
8. The broad education necessary to understand the impact of engineering solutions in a global and societal context;
9. A recognition of the need for and the ability to engage in life-long learning;
10. A knowledge of contemporary issues;
11. The ability to use modern engineering techniques, skills, and computing tools necessary for engineering practice.

Accreditation

The B.E. (M.E.) program is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). This guide is provided to incoming or transferring Mechanical Engineering undergraduate students to assist them in selecting the se-

quence 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 2004–Spring 2005 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 in good academic standing who were admitted to the University but not immediately accepted into the major may apply for acceptance after they have completed their first semester at the University. Priority for admission to the mechanical engineering major is given to those students who have 1). completed MAT 132 and PHY 132 or their equivalents, 2). earned a G.P.A. of 3.0 in all mathematics and physics courses with no more than one grade in the C range, and 3). received completed course evaluations for all transferred courses that are to be used to meet requirements of the major. Students interested in joining the Mechanical Engineering major are encouraged to talk to the Undergraduate Program Director (listed in the front matter of this document).

Information for Transfer Students

Students who are interested in transferring or have transferred into department of mechanical engineering from community colleges or other universities should consult the Undergraduate Transfer Office (http://ws.cc.stonybrook.edu/ugadmissions/transfer/) regarding transfer admission, transfer Credits evaluations as well as other university and CEAS policies regarding transfer credits. Advising by the Undergraduate Transfer Office for new transfers is available on a walk-in basis, Monday through Friday 10:00am - 4:00pm, by e-mail, and by telephone at (631) 632-7028. The office is located in Room 134 of the Administration Building.

The Undergraduate Transfer Office maintains and publishes a list of courses from other institutions that are deemed equivalent to Stony Brook courses. Transfer students must fill out the appropriate forms at the Undergraduate Transfer Office in order for their transfer credits appear in the Solar system. For courses that are not on the list, students should fill out a transfer Credits evaluation form in CEAS Undergraduate Student Office. The form will be sent out for transfer Credits evaluation to the department that a potentially equivalently course is offered.

The policy with regard to transfer credits is uniform throughout the College of Engineering and Applied Sciences. Faculty members in the appropriate department evaluate all transfer credits, e.g., mathematics courses are evaluated by the Department of Mathematics, etc. No Credits is granted for grades less than C. Credits earned at unaccredited institutions or in a technical (2-year/Associates Degree program) curriculum are generally not accepted for transfer or technical elective Credits.

For advice about registering courses required for mechanical engineering major, transfer students should consult their faculty advisor or Undergraduate Program Director of the Mechanical Engineering Department.

Occasionally, students wish to take a course at another institution during their matriculation at Stony Brook. This happens, for example, if students (especially transfer students) find themselves out of sequence; Credits for a summer course at another institution might ease their subsequent scheduling problems. In these cases, students may request advanced written permission from the Undergraduate Program Director of the Department so that there is no doubt that such courses taken off campus are transferable.

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.

Diversified Education Curriculum (DEC)

The general education Diversified Education Curriculum (DEC) Requirements of the University are described in the Diversified Education Undergraduate Bulletin, and are summarized in Table 1. DEC requirements are divided into three categories: 1). University Skills, 2). Disciplinary Diversity, and 3). Expanding Perspectives and Cultural Awareness. Additionally, each category is subdivided and assigned a letter from A through K. (Categories D and K are not required for the Bachelor of Engineering degree). Courses satisfying each letter category may be taken at any time, except for Writing Workshop, WRT 101, 102 (or 103) which must be taken in the freshman year. **EST 392 (or ECO 108) is a required DEC course for Mechanical Engineering majors and may be used to satisfy letter category F**. No single DEC course may be used to satisfy two categories simultaneously; however, it may be used to satisfy the major requirements. For example, PHY 131 satisfies DEC category E and the major requirements. For more details, please refer to the Diversified Education Undergraduate Bulletin.

Students are encouraged to visit the CEAS (College of Engineering and Applied Sciences) Undergraduate Student Office for a formal review of their D.E.C. requirements at least two semesters prior to their expected date of graduation. Students should use Table 1 in planning their DEC course assignments.

Table 1: DEC Requirements

Level	Courses	Minimum Grade	Examples
University Skills:			
A – Writing Workshop	2	C	WRT 101,102
B – Interpreting Texts in the Humanities	1	D	
C – Mathematical and Statistical Reasoning	1	C	MAT131
Disciplinary Diversity:			
E – Natural Sciences	2	D	PHY 131
F – Social and Behavioral Sciences	1	D	EST392/ECO108
G – Humanities	1	D	
Expanding Perspectives and Cultural Awareness:			
H –Implications of Science & Technology	1	D	
I – European Traditions	1	D	
J – The World Beyond European Traditions	1	D	

Notes:

- Only EST392 or ECO108 may be used for DEC *F*.
- DECs *C* and *E* are automatically satisfied because of the Mechanical Engineering curriculum's mandatory mathematics and physics course requirements.
- Physics and Math have new minimum grade policies. Please check with these departments to determine their grade and course repetition policies.

Notes on Category A requirements:

1. A score of 4 or 5 on the University's writing placement examination, or a score of 3, 4, or 5 on either the AP English Language and Composition examination or the AP English Language and Literature examination, satisfies the first course of the two course requirement.

2. Students must begin completion of Category A during their first year at Stony Brook and must take writing courses in sequence until the requirement is satisfied. In addition, completion of Category A will be a prerequisite for MEC 300 beginning in Fall 2005. Starting from fall 2005, students will not be allowed to take MEC 300 without completing the Category A requirements.

3. All transfer and re-matriculated students who have passed, with a grade of C or higher, a composition course judged equivalent to WRT 102 or WRT 103 will have satisfied this requirement.

4. Once matriculated, the student must complete Category A at Stony Brook. In other words, you cannot take these writing courses at another institution after you have enrolled at Stony Brook.

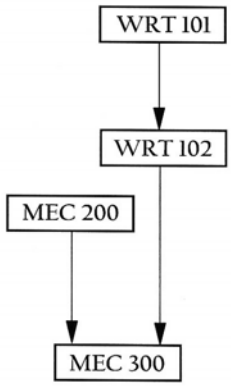

Figure 1: Writing and technical communication requirements linked through pre-requisites.

Notes on Category I and J requirements:

1. In choosing courses to satisfy D.E.C. I and J, students should choose one with a humanities designator and one with a social and behavioral sciences designator.

2. B.E. degree students may petition the CEAS Undergraduate Student Office for permission to substitute a category K course for a category I or J course. Category K deals with the American Experience in Historical Perspective. It is not required for a B.E. degree. *Petitions are approved only in special circumstances and must be approved before taking the DEC K course.*

Requirements for the Major in Mechanical Engineering (MEC)

The major in mechanical engineering leads to the Bachelor of Engineering degree. Completion of the degree requirements for the major requires approximately 107 credits. **Students are strongly encouraged to visit the Office of Mechanical Engineering Undergraduate Program Director for a formal review of their MEC major requirements at least one semester prior to their expected date of graduation. A sample graduate clearance form is shown in Table 2.**

1. **Mathematics**

a. MAT 131, 132 Calculus I, II

b. 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

Note: The following alternate calculus course sequences may be substituted for MAT 131, 132 in major requirements or prerequisites:

- MAT 125, 126, 127
- AMS 151, 161
- MAT 141, 142

2. **Natural Sciences**

a. PHY 131/133, 132/134 Classical Physics I, II and labs

b. PHY 251 Modern Physics *and* PHY 252 Modern Physics Laboratory,
or ESG 281 An Engineering Introduction to the Solid State

c. CHE 131 General Chemistry *or* CHE 141 Honors Chemistry NEW! or ESG 198

Notes: The following alternate physics course sequences may be substituted for PHY 131/133, 132/134:

- PHY 125, 126, 127 Classical Physics A, B, C
- PHY 141, 142 Classical Physics I, II: Honors

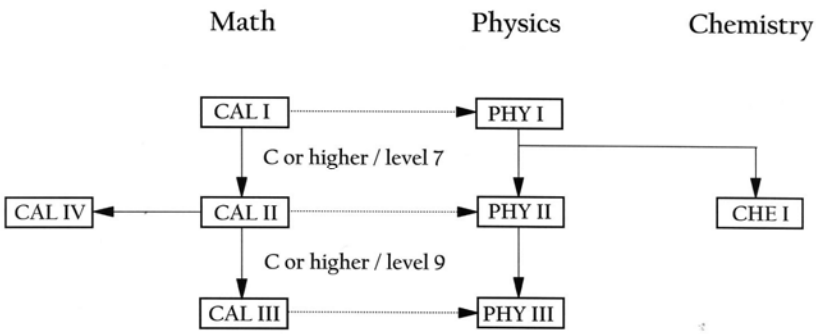

Figure 2: Required courses in Mathematics and Natural Sciences linked through pre-requisites (solid lines) and co-requisites (dotted lines).

3. **Laboratories**

- MEC 316 Mechanical Engineering Laboratory I
- MEC 317 Mechanical Engineering Laboratory II

4. **Mechanical Engineering**

   - MEC 101 Engineering Computing and Problem Solving I
   - MEC 102 Engineering Computing and Problem Solving II
   - MEC 125 Fundamentals of Machining Laboratory
   - MEC 202 Engineering Drawing and CAD I
   - MEC 203 Engineering Drawing and CAD II
   - MEC 214 Probability and Statistical Analysis for Experiments
   - MEC 260 Engineering Statics
   - MEC 262 Engineering Dynamics
   - MEC 301 Thermodynamics
   - MEC 305 Heat and Mass Transfer
   - MEC 325 Manufacturing Processes and Machining
   - 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 Engineering Design Methodology and Optimization
   - MEC 410 Design and Analysis of Machine Elements
   - MEC 411 System Dynamics and Control
   - MEC 422 Thermal Systems Design
   - MEC 440 Mechanical Engineering Design I
   - MEC 441 Mechanical Engineering Design II

7. **Engineering Economics**

   - EST 392 Engineering and Managerial Economics
     or ECO 108 Introduction to Economics

8. **Technical Electives**

Three technical elective courses are required, at least two must be a mechanical engineering (MEC) course 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: 350, 391/392, 393, 398, 402, 412, 442, 450, 455, 460, 470, 490, 491, 492, 499

Applied Math and Statistics:
AMS: 310**,** 311, 312, 315, 341, 342, 351

Computer Science:
CSE: 308, 327, 328, 329, 352

Electrical Engineering:
ESE: 305, 306, 307, 310, 311, 316, 330, 347, 350, 352, 380, 381

Material Science and Engineering
ESG: 333, 339
ESM: 309, 334, 335, 336, 338, 352, 353, 369

Technology and Society
EST: 326, 327, 393

Other electives for the major require the approval of the undergraduate program director.
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.

9. **Writing and Oral Communication Requirement** (see Figure 1 for pre-requisites)

- MEC 200 Technical Communication in Mechanical Engineering I
- MEC 300 Technical Communication in Mechanical Engineering II

Recommended Course Sequence

Table 1 shows a recommended course sequence. Due to strict pre- and co-requisite requirements (see Figure 3), students are **strongly** advised to follow this course sequence. Any deviation from this course sequence should be discussed with the faculty advisor.

Table 1: Recommended course sequence (as of Fall, 2007)

		Fall			Spring
Freshman	1	ITS 101		1	ITS 102
	4	MAT 131		4	MAT 132
	4	PHY 131+133		4	PHY 132+134
	3	WRT 101		3	WRT 102
	2	MEC 101		2	MEC 102
	3	DEC (B)		3	DEC (G)
Total	**17**			**17**	
Sophomore	4	MAT 203/AMS 261		4	MAT 303/AMS 361
	4	PHY 251+252/ESG 281		4	CHE 131/ESG 198
	1	**MEC 125***		1	MEC 214
	1	MEC 200		2	**MEC 203**
	1	**MEC 202**		3	**MEC 262†‡**
	3	**MEC 260†**		3	MEC 363‡
	3	DEC (H)			
Total	**17**			**17**	
Junior	4	ESG 332		1	MEC 300
	3	MEC 301		3	MEC 305
	3	MEC 316		3	MEC 310
	3	MEC 364		2	MEC 317
	3	DEC (F, EST 392/ECO 108)		3	MEC 320
				3	MEC 325
Total	**16**			**15**	
Senior	3	MEC 410		3	MEC 441
	4	MEC 411		3	Tech Elec #2
	3	MEC 422		3	Tech Elec #3
	3	MEC 440		3	DEC (I)
	3	Tech Elec #1		3	DEC (J)
Total	**16**			**15**	
		TOTAL = 130			

* May be taken in any semester prior to or including MEC 325.

† A minimum grade of "C" or higher is required in order to graduate.

‡ A minimum of "C" or higher is required in MEC 260 to take this course.

(**bold**) MEC 125, 202, 203, 260, and 262 are offered both fall and spring; all other courses offered only in their respective semesters. MEC 262 and MEC 363 are <u>also</u> offered during the summer, in general.

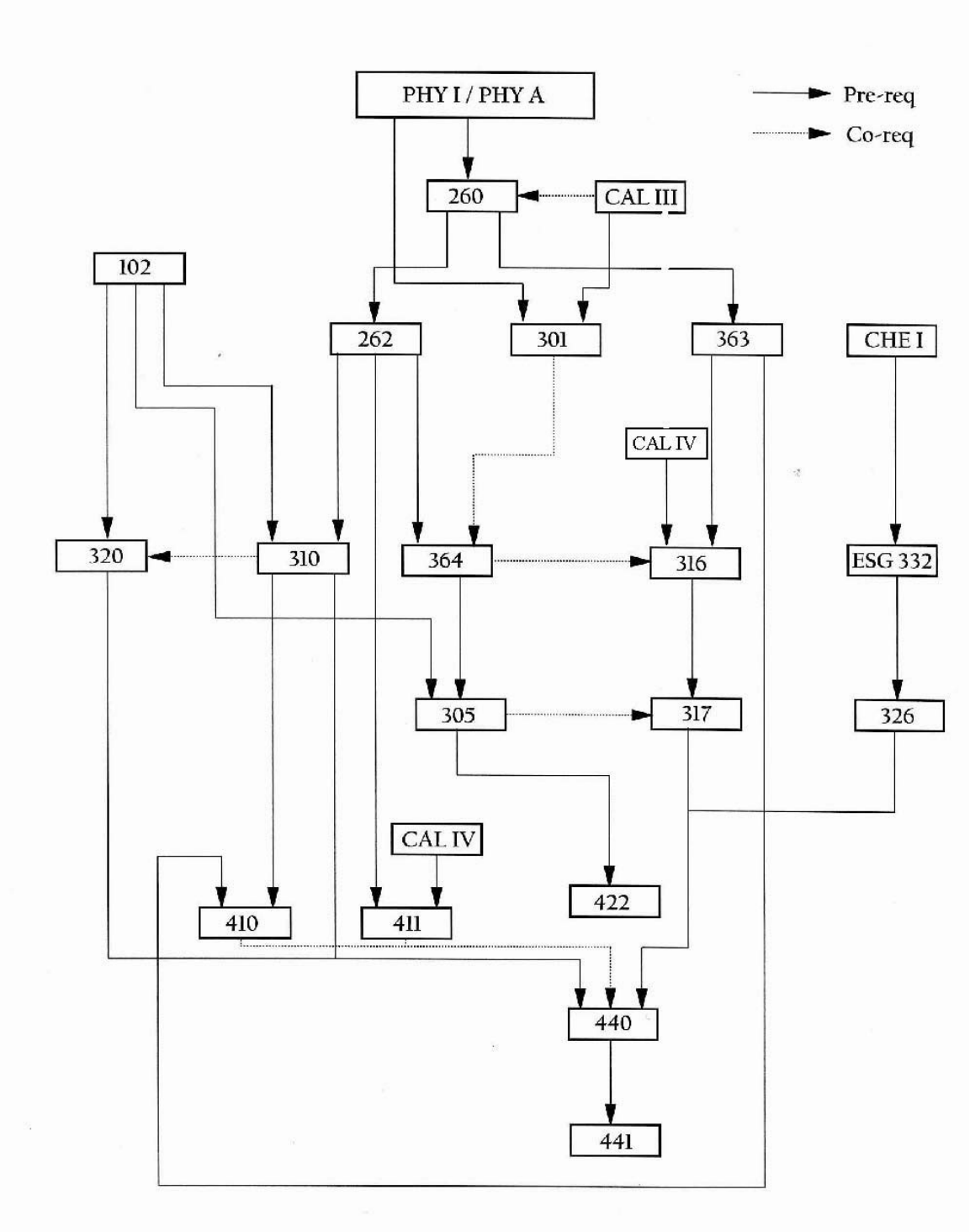

Figure 3: Required mechanical engineering courses linked through pre-requisites or co-requisites. Non-mechanical engineering courses are designated with their own prefixes such as ESG or CHE or PHY or CAL.

Note: Students are not allowed to register for a course without meeting its pre- or co-requisite requirements. These requirements are enforced through a computer based course registration system by the Solar System.

Table 2: A sample graduation clearance form.

Graduation Clearance Form (students entering program after 12/31/07)							
NAME:							
COURSE	SB	TR	GRADE	MAT	SCI	ES	DES
EST 392/ECO 108 (3)							
CHE 131, 141 or ESG 198 (4)					4		
MAT 131 (4)				4			
MAT 132 (4)				4			
MAT 203 or AMS 261 (4)				4			
MAT 303 or AMS 361 (4)				4			
PHY 131 + 133 (4)					4		
PHY 132 + 134 (4)					4		
PHY 251 + 252 or ESG 281 (4)					4		
ESG 332 (4)						4	
MEC 101 (2)						2	+
MEC 102 (2)						2	+
MEC 125 (1)							1
MEC 200 (1)							
MEC 202 (1)						1	+
MEC 203 (2)						2	+
MEC 214 (1)				1			
MEC 260 (3)						3	
MEC 262 (3)						3	
MEC 300 (1)							
MEC 301 (3)						3	
MEC 305 (3)						2	1
MEC 310 (3)						2	1
MEC 316 (3)						2	1
MEC 317 (2)						2	
MEC 320 (3)							3
MEC 325 (3)						3	
MEC 363 (3)						3	+
MEC 364 (3)						3	+
MEC 410 (3)						1	2
MEC 411(4)						2	1
MEC 422 (3)						3	1
MEC 440 (3)							3
MEC 441 (3)							3
							3
TE 1 (3)						3	
TE 2 (3)						3	
TE 3 (3)						3	
OTHER							
TOTALS				17	16	52	20

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 an "Advising Week" before the pre-registration 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 the courses MEC 260, 262, 301, 305**,** 310, 316, 317, 320**,** 325, 363, 364, 410, 411, 422**,** 440, 441, 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.

New! Minimum Grades
Starting in spring, 2008, 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 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.

Note also that the Physics and Mathematics departments have minimum grade requirements for their courses, including those required for Mechanical Engineering. 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 200, 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 semester 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, and the CEAS.

New! Allowed Calculators
Effective spring, 2008 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, 2008:

- 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://www.ncees.org/exams/calculators/ .

Other College-Wide Information

CEAS Undergraduate Student Office (Room 127, Engineering, (631) 632–8381)
The Undergraduate Student Office of College of Engineering and Applied Sciences provides a variety of services to undergraduate students within the College, including general academic advising, appropriate referrals for advising within a specific major, D.E.C. (Diversified Education Curriculum) requirement advising, and assistance with processing transfer credits. The Undergraduate Student Office also receives and processes student petitions to the CEAS Committee on Academic Standing and Appeals (CASA). Student organizations, including professional and honor societies, maintain mailboxes within the Undergraduate Student Office, and scholarships and internships for CEAS students are also coordinated through this office (see below). The Undergraduate Student Office is open Monday to Friday, 9:00 a.m. to 5:00 p.m.

Internship Program
The College of Engineering and Applied Sciences manages an extensive internship program for students in engineering and applied science disciplines. Students interested in obtaining an internship

with an outside organization should contact the Undergraduate Student Office (Room 127, Engineering) for information on position postings and application procedures. Internships obtained through CEAS are paid and may or may not include academic Credits.

Scholarships
CEAS students may apply for a variety of scholarships available to sophomores, juniors, and seniors. Applications can be obtained from the Undergraduate Student Office (Room 127, Engineering) beginning in early December for the following academic year.

The Combined BE/MS Degree Program in Mechanical Engineering

The combined 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 and 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 contact the Graduate Program Director.

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 2.0 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 125 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

Other electives require approval of the undergraduate program director.

Mechanical Engineering Course Descriptions

MEC 101: Engineering Computing and Problem Solving I, Prerequisite: None, *Fall*, Credits 2. Computer integrated introduction to engineering design and analysis. The mechanical engineering profession, engineering ethics, and engineering impact on society. Engineering equations, graphs, dimensional analysis, curve fitting, optimization in engineering design. Introduction to vectors and engineering statics, failure, and materials selection. Use of spreadsheets and MATLAB.

MEC 102: Engineering Computing and Problem Solving II, Prerequisite: MEC 101, *Spring*, Credits 2. Introduction to programming with MATLAB. Topics include base systems, finite machine arithmetic, variables and storage, control structures, iteration, arrays and matrix operations, functions, reading and writing data files, interfacing MATLAB with other languages. Emphasis is on developing good programming skills, debugging, documenting code, and optimization.

New! **MEC 125: Fundamentals of Machining Practices, Prerequisite: MEC major or permission of instructor, *Spring and Fall*, Credits 1.** Hands-on experience in the fundamentals of machining including metrology tools and devices, saw, sheet metal working, drilling, reaming, taping, turning, boring, milling, welding, and rapid prototyping.

MEC 200: Technical Communication in Mechanical Engineering I, Prerequisites: MEC Major; U2 standing, *S/U Grading, Spring,* Credits 1. Introduction to technical writing and oral communication with topics chosen from mechanical engineering. Includes technical memo and report writing and an introduction to researching sources of information. Emphasizes the development of oral presentation skills

MEC 202: Engineering Drawing and CAD I, Prerequisite: MEC major, or permission of the Department, *Fall and Spring,* Credits 1. Introduces methods used to communicate design ideas through the techniques of freehand technical sketching and computer-aided design software. Includes the principles of engineering drawing and sketching for mechanical design and the application of computer-aided design software in developing engineering drawings and mechanical designs.

MEC 203: Engineering Drawing and CAD II, Prerequisite: MEC 202, *Fall and Spring,* Credits 2. Application of computer graphics and solid modeling to design and representation of 3D objects, their assembly and tolerance analysis. Includes hands-on experience in the use of CAD software packages for solid modeling.

New! **MEC 213: Studies in Nanotechnology, Prerequisites: PHY 131 or PHY 125; CHE 131 or ESG 198, *Spring*, Credits 2.** The emerging field of nanotechnology develops solutions to engineering problems by taking advantage of the unique physical and chemical properties of nanoscale materials. This interdisciplinary, co-taught course introduces materials and nano-fabrication methods with applications to electronics, biomedical, mechanical and environmental engineering. Guest speakers and a semester project involve ethics, toxicology, economic and business implications of nanotechnology. Basic concepts in research and design methodology and characterization techniques will be demonstrated. Course is cross-listed as BME 213, MEC 213, and EST 213 and is required for the Minor in Nanotechnology Studies (NTS).

New! **MEC 214: Probability and Statistics for Mechanical Engineers**, **Prerequisite: MAT 126 or 131 or 141 or AMS 151; MEC major or permission of instructor, *Spring*, Credits 1**. Foundations of probability and statistics as applied to mechanical measurements and experimentation. Basic statistical analysis of data and assessing likelihood of future events based on past history. Concept of

random sampling. Uncertainty analysis and error propagation, using both analytical and graphical tools. Assessing dominant sources of error in measurements.

MEC 260: Engineering Statics, Prerequisites: PHY 131/133 or 141 or 125, Co-requisite: MAT 203 or AMS 261, *Fall,* Credits 3. 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.

MEC 262: Engineering Dynamics, Prerequisites: MEC260 with a grade of "C" or higher, *Spring,* Credits 3. 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.

MEC 300: Technical Communication in Mechanical Engineering II, Prerequisite: WRT 102; MEC major; U3 or U4; MEC 200. *Spring, S/U Grading.* Credits 1. Aims to ensure proficiency in the types of communication necessary for success in the engineering profession. Provides students with the ability to apply their knowledge of correct written and spoken English to the diverse modes of communication encountered and used by engineers in the professional workplace.

MEC 301: Thermodynamics, Prerequisites: AMS 261 or MAT 203; PHY 131/133 or 141 or 125, *Fall*, Credits 3. 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.

MEC 305: Heat and Mass Transfer, Prerequisites: MEC 301 and 364; MEC 102 or MEC 111 or MEC 112 or CSE 114 or 130 or ESG 111 or ESE 124*, Spring*, Credits 3. 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 condensation and boiling phenomena, thermal radiation, and radiation heat transfer between surfaces. Applications to heat transfer equipment are covered throughout the course.

MEC 309: Numerical Methods for Engineering Analysis, Prerequisites: MEC 102 or MEC 111 or MEC 112 or CSE 114 or 130 or ESG 111; AMS 261 or MAT 203; AMS 361 or MAT 303 *Fall,* Credits 3. Solving non-linear equations, systems of linear equations, interpolation/extrapolation, curve fitting, integration, and differential equations. Special emphasis on the implementation of numerical methods in FORTRAN computer programs to solve computation problems that arise in the engineering design process.

MEC 310: Introduction to Machine Design, Prerequisites: MEC 102 or MEC 111 or MEC 112 or CSE 114 or 130 or ESG 111*;* MEC 262 (ESG 316 for ESG Majors); Pre- or co-requisites: MEC 203, *Spring,* Credits 3. 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 prin-

ciples behind the operation of various machine elements such as gears and gear trains, cams, flywheels, roller and journal bearings, couplings, clutches, brakes, belts, and chains and their design, and analysis techniques.

Revised! **MEC 316: Mechanical Engineering Lab I: *Sensors and Instrumentation*, Prerequisites; MAT 303 or AMS 361; MEC 214 and MEC 363; Co-requisites: MEC 301, 364, *Fall,* Credits 3.** The spatial and temporal resolution of modern instrumentation and sensors that are particular to mechanical engineering. Concepts of Fourier analysis and frequency responses are discussed together with the statistical analysis of data. Includes basic circuit components. Laboratory safety. Students learn to operate instruments for measuring temperature, pressure, flow velocity, displacement, angle, acceleration, and strain. Design project. Laboratory fee required.

MEC 317: Mechanical Engineering Laboratory II, Prerequisites: MEC 316 and MEC 364, Co-requisites: MEC 305. *Spring,* Credits 2. Hands-on experience in solid and fluid mechanics and heat transfer. Emphasis is on the understanding of fundamental principles as well as familiarity with modern experimentation. Lectures at the beginning of the course provide background information and theories of experimentation. Student groups perform four experiments each in solid mechanics and in fluid mechanics and heat transfer. Report writing is an integral part of the course, with emphasis on design of experiment, interpretation and presentation of data, error analysis, and conclusions. Laboratory fee required.

MEC 320: Engineering Design Methodology and Optimization, Prerequisites: MEC 102 or MEC 111 or MEC 112 or CSE 114 or 130 or ESG 111, Co-requisite: MEC 310, *Spring,* Credits 3. The general process of engineering design as a systematic and disciplined process. Covers materials related to the formulation of design specifications and criteria; conceptual design and evaluation of the design options; design creativity; formulation of analyzable models; simulation and optimization techniques; design for manufacture; design for reliability; engineering economics; and engineering ethics.

MEC 323: Internal Combustion Engine, Prerequisites: MEC 305, *Varies*, Credits 3. Introduces different types of internal combustion engines and their operations. Topics include the innovative concept of gas generator-expander engine; thermodynamics fundamentals; fuel-air cycle analysis; engine combustion and emission processes; engine operating characteristics. Includes both the relevant fundamental concepts and the extensive practical knowledge base on which engine research, development, and design depend.

New! **MEC 325: Manufacturing Processes and Machining, Prerequisite: ESG 332, Pre-or Co-Requisite: MEC 125. *Spring*, Credits 3.** 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.

MEC 350: Energy Conversion and Alternate Energy Technologies, Prerequisites: MEC 301, *Varies*, Credits 3. Energy conversion principles, principal energy sources, and energy storage systems. Production technologies of useful energy and useful work with emphasis on technologies based on energy sources other than fossil or nuclear fuels, including direct energy conversion technologies (fuel cells, batteries, hybrid electric vehicles, and MHD generators), solar energy (solar thermal energy and photovoltaics), and wind energy.

MEC 363: Mechanics of Solids, Prerequisite: MEC 260 with a grade of "C" or higher, *Spring,* Credits 3. Stress and deformation of engineering structures and the influence of the me-

chanical 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.

MEC 364: Introduction to Fluid Mechanics, Prerequisite: MEC 262, Pre- or Corequisite: MEC 301, *Fall,* Credits 3. 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.

MEC 381: Transport and Fate of Pollutants, Prerequisite: AMS 361 or MAT 303, Credits 3. General mechanisms that describe the physical transport and chemical transformations of pollutants in the air, water, and soil. Major global cycles are also considered from a transport-transformation perspective. Specific examples include lake eutrophication, acid rain deposition, river pollution, and the dispersal of air pollutants from single (point) sources and multiple (area) sources.

MEC 391: Introduction to Automotive Engineering I, Prerequisites: MEC 262, MEC 363, First part of a year-long course. Review of Society of Automotive Engineers (SAE) Collegiate Design competitions of past years and the rules of specific competitions and other competition-related issues. Selected engineering topics and mathematical/software tools are introduced including their application to solving engineering problems and to achieving design objectives.

MEC 392 Introduction to Automotive Engineering II, Prerequisite: MEC 391. Credits 3. A continuation of MEC 391.

MEC 393: Engineering Fluid Mechanics, Prerequisite: MEC 364, Credits 3. 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 inertial begun in MEC 364.

MEC 398: Thermodynamics II, Prerequisite: MEC301 and MEC 364, Credits 3. Psychometrics and psychometric 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.

MEC 402: Mechanical Vibrations, Prerequisites: MEC 262 and MEC 363, Credits 3. 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.

MEC 406: Energy Management in Commercial Buildings, Prerequisites: MEC 398, Credits 3. Basic heating, ventilating, and air-conditioning (HVAC) system design and selection for commercial buildings. Includes both low-rise and high-rise structures. Selection of central plant components and equipment, calculation of space heating and cooling load, computer techniques for estimating annual energy consumption. ASHRAE codes. Building controls. BACnet.

MEC 410: Design of Machine Elements, Prerequisites: MEC 310 and MEC 363*, Fall,* Credits 3. 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.

MEC 411: Control System Design and Analysis, Prerequisites: MEC 262; AMS 361 or MAT 303, *Fall,* Credits 4. 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.

MEC 412: Computer-Aided Design, Prerequisites: MEC 310 and MEC 363, Credits 4. Application of the computer to solution methods and design in engineering. Discusses computer graphics, geometric modeling, and finite element analysis in structural mechanics, fluid mechanics, and heat transfer. Applied stress analysis. Applied fluid mechanics and heat transfer. Includes hands-on experience in the use of CAD software packages for solid modeling, system modeling, and finite element analysis. Integrated CAD in which the analysis of fluid flow, heat transfer, and solid mechanics are combined to solve a design problem.

MEC 420: Turbomachinery and Applications, Prerequisites: MEC 364, Credits 3. Classification of turbomachines, rotating flows, aerothermodynamic design of turbomachines, energy transfer between fluid and rotor, axial and radial devices, compressible gas flow, three-dimensional effects, rotating stall and surge theory. Numerous applications and design issues. Sample devices include propellers, fans, blowers, windmills, Pelton wheels, turbines, compressors, lawn sprinklers, etc.

MEC 421: Statistical Quality Control and Design of Experiments, Prerequisites: MEC 317, Credits 3. Online techniques that determine and control the quality of mass-manufactured products on a real-time basis by means of statistical analysis. Offline use and applications of the design-of-experiment and Taguchi methods to optimize a product and a process design. The concept of total quality management. Histograms, tests for normality, variables, and attribute control charts, orthogonal arrays, and signal-to-noise arrays. Z-transform for the evaluation of the percentage of nonconforming parts, tests for special causes. Zbar-R charts, and process capability analysis. Acceptance quality level and lobby-lot inspection. This course offered as both AMS 421 and MEC 421.

MEC 422: Thermal System Design, Prerequisite: MEC 305, *Spring,* Credits 3. 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.

MEC 440: Mechanical Engineering Design I, Prerequisites: MEC 300, 310, 317, 320, 326, and MEC major: U4 standing, Co-requisite: MEC 410 and 411, *Fall,* Credits 3. Part I of the two-semester capstone design project sequence. Senior students select a project, 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. Laboratory fee required. The final grade will be assigned at the end of the two course sequence MEC 440-441.

MEC 441: Mechanical Engineering Design II, Prerequisite: MEC 440, *Spring,* Credits 3. Part II of the two-semester capstone design project sequence. Students complete the project design, building and test a prototype, write a mid-term report and a final design report as well as giving an oral presentation. Not counted as a technical elective. Laboratory fee required.

MEC 442: Introduction to Experimental Stress Analysis, Prerequisites: MEC 363, *Varies*, Credits 3. 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.

MEC 450 Mechatronics, Prerequisites: MEC 316 and MEC 319; *Fall,* Credits 3. 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.

MEC 455: Applied Stress Analysis, Prerequisite: MEC 363, *Spring,* Credits 3. 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.

MEC 460 Introduction to Robotics, Prerequistes: MEC 262; U4 standing, *Spring*, Credits 3.
Theory and Applications Robot components and mechatronic aspects of robotics (sensors, actuators, end effectors, system integration). Rotation, translation, rigid-body transform. Robotics foundations in kinematics and inverse kinematics, dynamics, serial and parallel manipulators and their duality. Introduction to mobile robots and LEGO Robotics, control theories, motion planning, trajectory generation, grasping and manipulation, robotic programming language, industrial robotics, manufacturing automation, and societal impacts. Hands-on projects. *Note*: Not for Credits in addition to CSE 378.

MEC 470 Introduction to Engineering Tribology, Prerequistes: MEC 363 and 364; Spring, Credits 3. 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.

MEC 475: Undergraduate Teaching Practicum, Prerequisites: U4 standing; a minimum GPA 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, Credits 3. 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.

MEC 488: Mechanical Engineering Internship, Prerequisite: Permission of undergraduate program director, Credits 3 to 9. *S/U Grading*. Participation in off-campus engineering practice. Students are required to submit to the department a proposal 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. **Note**: MEC 488 may *not* be used for to satisfy degree requirements in any way, and is not a technical elective.

MEC 490: Topics in Mechanical Engineering, Prerequisites: U3 or U4 standing in a B.E. degree major; permission of department (course prerequisites vary with topic), Fall, Spring, Credits 1-4. 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 for Credits as the topic changes.

MEC 491: Topics in Mechanical Engineering, Prerequisites: U3 or U4 standing in a B.E. degree major; permission of department (course prerequisites vary with topic), Fall, Spring, Credits 1-4. 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 for Credits as the topic changes.

MEC 492: Topics in Mechanical Engineering, Prerequisites: U3 or U4 standing in a B.E. degree major; permission of department (course prerequisites vary with topic), Fall, Spring, Credits 1-4. 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 for Credits as the topic changes.

MEC 499: Research in Mechanical Engineering, Prerequisite: Permission of department, Credits 0–4. 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.

Other Courses Offered by the Mechanical Engineering Department in the Recent Past (but are not currently scheduled to be offered.)

MEC 100: Introduction to Engineering: Mechanical, Prerequisite: None, *Fall,* Credits 3. 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.

MEC 111: Computer Science for Engineers, Pre- or corequisites: AMS 151 or MAT 125 or 131 or 141; PHY 125 or 131/133 or 141, Spring, Credits 3. An introduction to computer science and the use of the computer for solving scientific and engineering-related problems. Students gain experience using the FORTRAN programming language. Primarily for engineering students not planning to take advanced computer science courses. May not be taken simultaneously with CSE 110. Students who have a C or higher in CSE 114 may not take MEC 111.

MEC 112: Practical C/C++ for Scientists and Engineers, Prerequisites: AMS 151 or MAT 125, 131 or 141; PHY 125, 131/133 or 141. Credits 3. Introduces computer sciences and the use of the computer for solving scientific and engineering problems using the C/C++ programming language. Students gain experience using graphical interface (GUI) and object-oriented programming concepts. Primarily for engineering students who are not planning to take advanced computer science courses. Students who have earned a C or higher in CSE 114 may not take MEC 112.

MEC 495: Professional Engineering Seminar, Prerequisites: CEAS major; U4 standing, Credits 1. S/U Grading. 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.

DEC E Category Courses offered from Mechanical Engineering

MEC 104: Practical Science of Things, Prerequisite: Satisfaction of entry skill in mathematics requirement, Credits 3. 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.

MEC 105: Everyday Science, Prerequisite: Satisfaction of entry skill in mathematics requirement, Credits 3. 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. Issues of design, safety, and environmental impact are also discussed.

MEC 160: Introductory Nuclear Science and Technology, Prerequisite: MAT 123 or level 4 on the mathematics placement examination, Credits 3. Introduces the basic concepts of nuclear science. Topics include: basic atomic structure; isotopes; mass-energy equivalence; binding energy; decay of radionuclides; nuclear reactions; fission and fusion; the interaction of radiation with matter; and biological effects of radiation. Discusses nuclear science concepts in the context of relevant applications such as nuclear medicine and imaging, nuclear power, radioactive waste, food irradiation, and weapons. Not intended for science majors.

DEC H Category Courses Offered from Mechanical Engineering

MEC 280: Pollution and Human Health, Prerequisite: One D.E.C. category E course, Credits 3. 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.

MEC 290: Nuclear Technology: History, Society, Medicine and the Environment, Prerequisite: One D.E.C. category E course, Credits 3. Introduces the history and applications of nuclear technology in our society and addresses the social and environmental implications and issues. Topics include radiation types and sources; biological effects, standards, and radiation protection; fission, breeding, and fusion; nuclear waste; weapons. Discusses current applications including power, food irradiation, medical applications, isotope dating, and advanced applications such as space power and propulsion, accelerators, and antiprotons.

FACULTY – AREAS OF SPECIALIZATION
DEPARTMENT OF MECHANICAL ENGINEERING

CUBAUD, Thomas, Assistant Professor — L155
Ph.D., 2001, Paris-Sud University/ESPCI — 632-9431
Thomas.Cubaud@sunysb.edu
Microfluidics, multiphase flows, interfacial fluid dynamics, complex fluids, nanotechnologies.

CHIANG, Fu-pen, Distinguished Professor & Chair — L105
Ph.D., University of Florida — 632-8311
Fchiang@notes.cc.sunysb.edi
Experimental solid mechanics; optical-nondestructive evaluation

GE, Q. Jeffrey, Professor — L113
Ph.D., University of California — 632-8305
Qiaode.Ge@stonybrook.edu
Design automation; robotics; CAD/CAM, mechanical systems analysis and simulation

HODSON, Donald, Adjunct Instructor — H152
M.S., 1969, S.U.C. at Buffalo — 632-9083
Donald.Hodson@sunysb.edu
C.A.D.; Industrial Arts; Desktop Publishing

HUANG, Peisen, Associate Professor — L163
Ph.D., University of Michigan, & — 632-8329
Tohoku University,
Peisen.Huang@sunysb.edu
Manufacturing; optical measurement; precision engineering

KAO, Imin, Professor — L131
Ph.D., Stanford University — 632-8308
Imin.Kao@sunysb.edu — 632-8301
Robotics; stiffness control; wiresaw manufacturing process; manufacturing automation; Taguchi methods

KINCAID, John, Professor — L113
Ph.D., The Rockefeller University — 632-8305
Jkincaid@notes.cc.sunysb.edu
Statistical mechanics and thermodynamics

KORACH, Chad, Assistant Professor — L131

Ph.D., Northwestern University — 632-1182
Chad.Korach@stonybrook.edu
Nanotribology

KUTKA, Robert V., Associate Professor — L157
Ph.D., Brown University — 632-8339
Robert.Kukta@sunysb.edu
Solid mechanics, thin films crystal growth, micro-mechanics of defects in crystals

LADEINDE, Foluso, Associate Professor — H224
Ph.D., Cornell University — 632-9293
Foluso.Ladeinde@sunysb.edu
Turbulence; highspeed flows; theoretical and computational fluid dynamics; materials processing

LONGTIN, Jon P., Associate Professor — L159/L107
Ph.D., University of California — 632-9436/632-1110
jlongtin@ms.cc.sunysb.edu
Short-pulse laser-material interactions, precision laser measurement techniques, microscale heat transfer

LOPEZ-PAMIES, Oscar, Assistant Professor — L139
Ph.D., 2006, University of Pennsylvania — 632-8249
Oscar.Lopez-Pamies@sunysb.edu
Solid mechanics; nonlinear homogenization; instabilities; polymers; multi-functional materials.

NAKAMURA, Toshio, Professor — L141
Ph.D., Brown University — 632-8312
Tnakamur@notes.cc.sunysb.edu
Solid mechanics; computational fracture mechanics

NEARON, Michelle, Assistant Professor — OE127
Director of Recruitment and Diversification for Engineering — 632-8343
Ph.D., 2000, State University of New York at Stony Brook.
Michelle.Nearon@stonybrook..edu

NEJAT, Goldie, Assistant Professor — L151
Ph.D., University of Toronto — 632-8310
Gnejat@notes.cc.sunysb.edu
Design, manufacturing

O'BRIEN, Edward E., Professor Emeritus — H218
Ph.D., Johns Hopkins University — 632-8344
Edward.Obrien@sunysb.edu
Fluid mechanics; theoretical studies of turbulence

transport, and chemical reactions

PURWAR, Anurag, Research Assistant Professor and SPIR Coordinator — L169
Ph.D., State University of New York at Stony Brook — 632-8542
Anurag.Purwar@stonybrook.edu
Computer modeling; theory, practical application

RASTEGAR, Jahangir, Associate Professor — H112
Ph.D., Stanford University — 632-8314
Jsrastegar@notes.cc.sunysb.edu
Kinematics, dynamics and control of high performance machinery, optimal design of mechanical systems

SESAY, Juldeh, Visiting Assistant Professor — H247
Ph.D., 2005, State University of New York at Stony Brook — 632-8493
Juldeh.Sessay@stonybrook.edu
Turbulent flows; combustion; computational fluid dynamics and biothermal fluid sciences.

SHARMA, Satya, Research Professor — OE208
Executive Director — 632-8350
Center of Excellence in Wireless and information Technology
Ph.D., 1975, University of Pennsylvania
Satya.Sharma@stonybrook.edu
Manufacturing and Production

TASI, James, Professor Emeritus — L135
Ph.D., Columbia University — 632-8309
James.Tasi@sunysb.edu
Solid mechanics; study of shock waves in crystal lattices and granular media; dislocation motion in crystals

WANG, Lin-Shu, Associate Professor — H214
Ph.D., University of California — 632-8324
Lshuwang@notes.cc.sunysb.edu
Energy conversion: foundation of thermodynamics; high-efficiency combustion engines

ZHANG, Hui, Associate Professor (on leave) — L165
Ph.D., Polytechnic University — 632-8492
Hui.Zhang@sunysb.edu
Materials processing; solidification and free surface problems; and computational fluid dynamics

ZHENG, Lili, Associate Professor — H220
Ph.D., Cambridge University — 632-8344
Lili.Zheng@sunysb.edu
Turbulence Combustion, solidification
magnetohydrodynamics and two phase flow

ZHOU, Yu, Assistant Professor — L153
Ph.D., Johns Hopkins — 2-8310
Yu.Zhou@sunysb.edu
Design, robotics

STAFF
DEPARTMENT OF MECHANICAL ENGINEERING

CASTELBUONO, Melissa — L109
Assistant to Chair — 632-8300
Melissa.castelbuono@stonybrook.edu

HSU, Ta-Yung — L129
Supervisor of Mechanical Engineering Laboratories — 2-8307
Ta-Yung.Hsu@sunysb.edu

LOMBARDO, Vaughn — L113
Department Secretary — 632-8310
Vlombar@notes.cc.sunysb.edu

MACHTAY, Noah — H148
Instructional Support Specialist — 632-9014
Noah.Machtay@sunysb.edu

VAN TRONK, Diane — L103
Graduate Program Secretary — 632-8340
Dvantronk@notes.cc.sunysb.edu

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 offered.

Important Campus Phone Numbers

STUDENT HEALTH CENTER	2-6740
HOUSING	
Campus Residences	2-6750
Off-Campus Housing Service	2-6770
MEAL PLAN	
Meal Plan Office	2-6517
ENVIRONMENTAL HEALTH SAFETY	
Emergency	333
Non-Emergency	2-6410

Directions to Stony Brook University

Stony Brook University is situated on an 1,100 acre site on the north shore of Long Island in southeastern New York. We are approximately 60 miles east of New York City. The GPS Coordinates of the Engineering Building are:

By Car:

From New York City, take the Long Island Expressway (LIE, I-495) eastbound from the Queens Midtown Tunnel in Manhattan or the Throgs Neck Bridge or Whitestone Bridge in Queens to exit 62, and follow Nicolls Road (Route 97) north for 9 miles. The main entrance to the University is on the left.

By Train:

Take the Long Island Railroad's Port Jefferson line from Penn Station in Manhattan to Stony Brook. The LIRR station is at the north end of the campus; bus service to the central campus is provided. Trains to and from Penn Station generally require a transfer at either Jamaica or Huntington. Hicksville is also a transfer point on some lines.

By Ferry:

Car ferries cross Long Island Sound at Bridgeport, Connecticut to Port Jefferson, Long Island Take Route 25A West to Nicolls Road (about 4 miles), and turn left on Nicolls Road. The University entrances are the first three intersections that you come to. From New London, Connecticut to Orient Point, Long Island take Route 25A west to Nicolls Road and proceed as above.

By Plane:

Long Island's Islip-MacArthur Airport is 16 miles from the campus and is serviced by direct flights by major airlines and commuter lines. New York City Area Airports (JFK, LaGuardia and Newark) are 50 miles to the west.

Driving directions to Stony Brook University from Islip-MacArthur Airport: exit the airport via Johnson Avenue. Turn right onto Veterans Memorial Highway (Route 454 West). Turn right onto Lakeland Avenue (Route 93) and right again onto Smithtown Avenue. After crossing the bridge, Smithtown Avenue becomes Ronkonkoma Avenue. Turn right onto Expressway Drive South and take the Long Island Expressway (I-495) east to Exit 62 (Route 97) and follow Nicolls Road north for 9 miles. The main entrance to the University is on the left.