MEC 101: Freshman Design Innovation  
Fall 2015

Instructor  
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Office Hours: Wednesday 2—5 pm

Teaching Assistants
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<td>Office Hours and location: Thursday 10am-1pm, Heavy engineering 207</td>
<td>Office Hours and location: Tuesdays 10am-1pm, Heavy engineering 207</td>
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Course Overview
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.

Course Learning Objectives
1. Demonstrate familiarity with dimensions, units, conversion, and engineering estimation
2. Calculate vectors as physical elements, basic engineering Statics (2D), balance of forces and moments
3. Calculate Stress, Strain, and failure for mechanical components loaded in tension, compression or shear, and fundamental material properties for material selection
4. Calculate mechanical energy, work, and power
5. Articulate how the motions of common mechanisms are realized
6. Demonstrate an understanding of basic electronics, sensing, actuation, and circuit drawing
7. Demonstrate Microcontroller programming using Arduino
8. Work in a team based project to design and fabricate an autonomous, microcontroller driven machine

Pre- or co-requisites
AMS 151 or MAT 125 or MAT 131 or MAT 141 or MPE level 4 or greater and PHY 125 or PHY 131 or PHY 141

Lectures
Tuesdays and Thursdays 1:00PM - 2:20PM FREY HALL 104

Rules for the lectures
1. You are required to attend all the classes. If you do miss a class for a legitimate reason, you are still responsible for finding out what was covered in that class and get lecture notes from
your class-mates or watch the echo recordings on Blackboard. Historically, students missing lectures consistently have done poorly in this class. The echo recordings are not a substitute for attending lectures as the technology can fail and recordings may not occur.

2. As a courtesy to other students, do not walk out of a lecture once you are in the class or talk to your class-mates.

3. Put your cell phones/pagers to silence before a class begins.

4. No cell phone, ipod, iphone, or any other device that can potentially distract the class should be used during lectures. Put them into silent mode before entering the lecture hall. Computers can be used only for taking lecture notes or reading e-book version of the text, but not for checking emails, facebook, etc. TAs will be roaming at the back of the class from time to time to check any violation of this policy.

Required Texts
2. MEC 101 MECHATRONICS KIT, Author: 24201, Publisher: ELEC XPRSS, Edition: F15 (you can buy from campus bookstore )

You can see the contents of this kit at https://sites.google.com/a/stonybrook.edu/mec101-robot-design-project-fall-2015/bookstore-kit. You will need parts in this kit to carry out HW exercises as well as to outfit a Two-wheel drive Mobile Robot called HWBot that I will provide to you.

The textbook should be available for purchase or rent at the campus bookstore, however, you may also be able to find it cheaper online by using a price comparison search engine, such as addall.com or bestwebbuys.com

Supplementary Material

Online resources, such as tutorials, on-line videos for Arduino programming, data sheets for electronics as assigned by instructor

Websites

Blackboard
Most of the information pertaining to this class can be found at the MEC 101 website at http://blackboard.stonybrook.edu

Piazza
This term we will be using Piazza for class discussion. Please refrain from asking answers to HW questions. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza.

Find our class page at: piazza.com/stonybrook/fall2015/mec101 and, sign up for free ASAP.

Grading

Homework/Quizzes 20% (the lowest HW grade will be dropped), Participation on Piazza 5%, 1 Midterm 25%, Final Project 25%, and Final Exam 25%

Grading is curved.
Homework

There will be about 10 homework. Homework will be either assigned in the class or posted at blackboard. You can access Blackboard at: http://blackboard.stonybrook.edu. If you have never used Stony Brook's Blackboard system, your initial password is your SOLAR ID# and your username is the same as your Stony Brook username, which is generally your first initial and the first 7 letters of your last name. For help or more information see: http://it.stonybrook.edu/services/blackboard. For problems logging in, go to the helpdesk in the Main Library SINC Site or the Union SINC Site, you can also call: 631-632-9602 or e-mail: helpme@ic.sunysb.edu

Homework must be turned in at the beginning of the class on the specified due date. No late homework will be accepted in any case. However, since emergencies do happen, I will drop the lowest HW grade for each student. Please adhere to the following guidelines for submission (Not following these guidelines will result in deduction of points by the grader)

1. Homework will be accepted only on regular A4/letter sized white or ruled paper – this is basically your most often used paper that you feed to your printer or copying machine. This rules out papers torn apart from your notebook or diary.
2. Staple neatly in top left corner. I don’t bring a stapler to the class, so please don’t ask for it.
3. Write your name and ID in the top right corner of the first page.
4. Homework will be accepted only in the beginning of the lecture.
5. HW solutions need not be typed, but they have to be done neatly.
6. To save time, the actual submission process will follow a divide and conquer approach for the collection of HWs. In each row, you should pass your HW to the student on your right, and then the last student in each row should pass it to the student ahead of him/her. The last student should put it on the professor’s table.

If you come in a few minutes late and I have already started the lecture, wait until the lecture is over to submit the HW. This should be done as an exception only, not as a rule. If I see students abusing my leniency, I reserve the right to not accept a HW submitted later than the beginning of the class.

Again, as a rule, all HWs are due IN THE BEGINNING OF THE CLASS.

Expectations

Communication

Effective Monday, January 7, 2013, email addresses in Blackboard will be systematically reset to users' official University EPO email address (firstname.lastname@stonybrook.edu or firstname.lastname@stonybrookmedicine.edu) and users will no longer be able to change their email address in Blackboard. This means that you are responsible for all email that go to your University EPO email address as your professors will be communicating with you this way.

Treat your Stony Brook email address as your primary means of communicating with others in the Stony Brook community. Make it a practice to log in at least daily to check for new
important items and address them. I use email and blackboard exclusively to communicate with you.

To access Google Apps for Education, go to http://www.stonybrook.edu/mycloud and authenticate with your NetID and NetID password.

**Fundamentals**

From your high school level classes, you should have acquired a working knowledge of basic Trigonometry (sines, cosines, basic trigonometry formula, etc.), Geometry, and basic Physics.

**Examinations**

**Midterm:** Tuesday, Oct 13, 2014 in class  
**Project Demo:** Thursday, December 4, 2014 in class  
**Final Exam:** See this link http://www.stonybrook.edu/registrar/Fall%202015%20Calendars/1158%20Fall%202015%20final%20exams%20REV%207-22-15.pdf

- All exams will be scheduled in class, unless otherwise stated

- If you miss an exam due to unforeseen events, you will have to provide me a proof of the reason, such as doctor’s certificate for a medical emergency or death certificate for death in family before I will give you a makeup exam. There will be no make-up exams for reasons that I deem are or were within your control. Thus, this rules out reasons such as pre-arranged vacation, travel, conflict with other exams or engagements.

**Calculator Policy**

Effective Spring, 2009 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 2009:
- 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/

I cannot grant an exception for the above calculator policy. You have to use one of the above permitted calculators in the exams or you may not use a calculator.

**Student Success Resources:** The following link is a brief guide to 'Student Success Resources' that are available on our campus: https://ucolleges.stonybrook.edu/links/academic-success-resources.pdf.

**Americans with Disabilities Act:** If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services,
ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.


**Academic Integrity:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

**Critical Incident Management:** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.