



Stony Brook University

<<Mechanical Engineering>>

MEC 450/550 Syllabus

Important Note: All materials, assignments, and deadlines are subject to change. It is your responsibility to stay in touch with your instructor, review the course site regularly, or communicate with other students, to adjust as needed if assignments or due dates change.

Part 1: Course Information

Course Title: Mechatronics

Course Catalog # & Section: MEC 450/550 Fall 2022

Credit Hours: 3

Pre-/Co-requisites: MEC 220 (prerequisite) and MEC 411 (corequisite)

Lectures: Tues 04:45-07:35PM

Instructor Name: Shanshan Yao, Ph. D.

Instructor Contact Information:

Email: shanshan.yao@stonybrook.edu (Please include MEC450/550 in the subject line, and your full name and SBID# in your emails)

Office Hours: Wed/Fri 3:30-5 PM at Light Engineering 134 (or by appointment)

Teaching Assistant: Yizong Li

Email: li.yizong@stonybrook.edu

Course Description:

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 are provided through integrated lab activities.

Required Course Textbook and Materials:

Lecture notes, assignments, and other course materials will be uploaded on Blackboard.

Recommended Readings/Bibliography:

- David G. Alciatore, Introduction to Mechatronics and Measurement Systems, McGraw-Hill Education, 5th Edition, 2019. (ISBN: 978-1-259-89234-9)
- William Bolton, Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering, Pearson, 6th Edition, 2015. (ISBN: 978-1-292-07668-3)
- Sabri Cetinkunt, Mechatronics with Experiments, Wiley, 2nd edition, 2015. (ISBN: 978-1-118-80246-5)
- Musa Jouaneh, Fundamentals of Mechatronics, Cengage Learning, 2012. (ISBN: 978-1-111-56901-3)

Course Delivery Mode and Structure:

Students must be mindful of all course expectations, deliverables, and due dates. Blackboard and SBU emails are required to access announcements, course materials, assignments, grades, feedbacks, and resources.

How We Will Communicate:

The preferred method of contact is via office hours and emails. Please include MEC450/550 in the subject line, and your full name and SBID# in your emails. The instructor and TA strive to respond to your emails as soon as possible, but please allow between 24-48 hours for a reply. Your Stony Brook University email must be used for all university-related communications. Students must have an active Stony Brook University email account and access to the Internet. *All instructor correspondence will be sent to your SBU email account.* Please plan on checking your SBU email account regularly for course-related messages. To log in to Stony Brook Google Mail, go to <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password. Please make sure that your email id is a current one in the blackboard system. <http://blackboard.stonybrook.edu>

Technical Requirements:

Some of the technologies and tools that would be required in this class are:

1. **Blackboard:** This course uses Blackboard for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. The Blackboard course site can be accessed at <https://blackboard.stonybrook.edu> If you are unsure of your NetID, visit <https://it.stonybrook.edu/help/kb/finding-your-netid-and-password> for more information. You are responsible for having a reliable computer and Internet connection throughout the term.
2. **Calculators: Only** the following calculators will be allowed for exams. This list of calculators is identical to that allowed for the FE exam, as well as the PE exam. The NCEES policy on calculators can be found here: <http://ncees.org/exams/calculator-policy/>
 - 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.

Technical Assistance:

If you need technical assistance at any time during the course or to report a problem, you can:

- Submit a help ticket on the web at <http://it.stonybrook.edu/services/itsm>)
- Call DoIT at (631) 632-9800 (technical support, log-in issues, computer support, wifi, software & hardware)
- Call (631) 2-CELT [631-632-2358]
- More information on Blackboard is available via Stony Brook IT: <http://it.stonybrook.edu/services/blackboard#section-6706>
- Frequently ask questions about the Blackboard LMS along with tutorials are available

here: <http://it.stonybrook.edu/services/blackboard/navigate-manage>

Part 2: Course Learning Objectives and Assessments

Learning Objectives and Activities:

1. Familiarity with basic types of sensors and actuators
2. Familiarity with basic circuits
3. Familiarity with digital signals
4. Familiarity with microcontroller systems
5. Familiarity with the mechatronics system level approach
6. An ability to identify and solve engineering problems and design an integrated system
7. An ability to work in a team and present the results effectively

How to Succeed in this Course:

- Keep abreast of class announcements
- Complete all assignments and reports on time
- Learn how to use the required technologies and tools

Assignments and Expectations:

Homework Assignments: There will be regularly assigned homework problems (due in one week), which will be posted on Blackboard and/or sent by email. Students will submit homework via Blackboard. Homework must be neat, professional, and well organized.

Exams: There will be two exams on the date to be announced by the instructor. Academic integrity during exams will be administered. Students must use a blue or black pen rather than a pencil for writing answers. More detailed instructions will be given prior to each exam. No makeup exam unless arranged prior to the exam. An unexcused exam absence will be scored as a zero.

Lab and Final Design Project (Proposal+Oral Presentation+Written Report): The lab activities and final design project will be conducted in teams of 4-5 students. Each team is expected to develop a mechatronic system application collaboratively to solve a real-world problem or achieve novel functions. Each team should submit a project proposal on the mechatronic systems you will work on and get approved by the instructor. At the end of this class, you will orally present the design in class and submit a comprehensive written report (in .pdf or .docx format). For submission on Blackboard, please name the file as MEC450_Group#_File name (e.g., MEC450_Group1_Design report). Graduate students should change 450 to 550.

Part 3: Course Schedule

****subject to changes****

	Date	Topics
Week 1	Aug 23	Course Introduction, Introduction to Mechatronics, Basic Electric Components
Week 2	Aug 30	Semiconductor Electronics, Sensors (Design Project Assigned)
Week 3	Sep 6	Sensors, Actuators (Design Proposal Due)
Week 4	Sep 13	Actuators, Analog Circuits, Signal Processing
Week 5	Sep 20	Digital Signals, Logic, and Circuits
Week 6	Sep 27	Data Acquisition and Interfacing
Week 7	Oct 4	Exam I
Week 8	Oct 11	Fall Break (No Class)
Week 9	Oct 18	Microprocessors and Microcontrollers
Week 10	Oct 25	Control Architectures, System Response and Analysis
Week 11	Nov 1	Experiments #1
Week 12	Nov 8	Experiments #2
Week 13	Nov 15	Mechatronic System Case Study
Week 14	Nov 22	Exam II (Comprehensive)
Week 15	Nov 29	Design Project Presentations
Week 16	Dec 6	Reading Day (No Class)
Week 17	Dec 13	Final Week (Design Report Due, Group Evaluation)

Part 4: Grading, Attendance, and Late Work Policies

Assessment & Grading:

Viewing Grades on Blackboard: Points you've earned for graded activities will be posted to the MyGrades screen in the Tools area of Blackboard.

In this course, you will be assessed on the following:

Activity/Assignment	Percentage (MEC450)	Percentage (MEC550)
Homework Assignments	20	15
Exam I	20	20
Exam II	20	20
Design Project Proposal	5	5
Design Project Presentation	10	10
Lab and Design Project Report	25	30
Total Possible	100	100

Note: There will be no exam retakes. Above distributions are subject to minor adjustments. Question(s) on graded homework/exam must be settled within one week after the graded material is returned.

Letter Grades:

Undergraduate:

[100, 95] = A
(95, 90] = A-
(90, 85] = B+
(85, 80] = B
(80, 75] = B-
(75, 70] = C+
(70, 65] = C
(65, 60] = C-
(60, 55] = D+
(55, 50] = D
<50 = F

Graduate

[100, 95] = A
(95, 90] = A-
(90, 85] = B+
(85, 80] = B
(80, 75] = B-
(75, 70] = C+
(70, 65] = C
(65, 60] = C-
<60 = F

Final grades for this course maybe be curved and will be decided based your relative placement in the class.

Attendance, Late Work, and Make Up Exam Policy:

Attendance: Attendance is required. Failure to participate in required course activities will impact your final grade.

Late Work Policy: No late submission is allowed.

Make up exams: If you miss an exam due to unforeseen events, you will have to contact the Office of Dean of Students to send me an official notification before I will give you a makeup exam. There will be no makeup exams for reasons that are within your control. Makeup exam policy is consistent with university policy on:

1. Student Participation in University Sponsored Events

http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/participation_univspnsored_activities.php

2. University policy on Final Exams:

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http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/records_registration/final_examinations.php

3. New York State Education Law regarding Equivalent Opportunity and Religious Absences

http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/equivalent_opportunity_religiousabsences.php

Part 5: Course and University Policies

Disability Support Services (DSS) Statement:

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information, go to the following website: <https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities> and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement:

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/commcms/academic_integrity/index.html

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.

Understand When You May Drop This Course:

It is the student's responsibility to understand when they need to consider disenrolling from a course. Refer to the Stony Brook Academic Schedule for dates and deadlines for registration: http://www.stonybrook.edu/commcms/registrar/calendars/academic_calendars

Incomplete Policy:

Under emergency/special circumstances, students may petition for an incomplete grade. Circumstances must be documented and significant enough to merit an Incomplete. If you need to request an incomplete for this course, contact me for approval as far in advance as possible.

Course Materials and Copyright Statement:

Course material accessed from Blackboard, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity. Students are expressly forbidden to upload course materials (e.g., lecture notes, homework answer keys, exams) developed by the instructor to websites that store

such materials. This is considered a violation of the copyright protection afforded the professor. Examples of websites include www.coursehero.com, www.chegg.com, and www.study.com.

Communication Guidelines and Learning Resources:

Maintain Professional Conduct Both in the Classroom and Online: The classroom is a professional environment where academic debate and learning take place. I will make every effort to make this environment safe for you to share your opinions, ideas, and beliefs. In return, you are expected to respect the opinions, ideas, and beliefs of other students—both in the face-to-face classroom and online communication. Students have the right and privilege to learn in the class, free from harassment and disruption. The course follows the standards set in the Student Code of Conduct, and students are subject to disciplinary action for violation of that code. If your behavior does not follow the course etiquette standards stated below, the grade you receive for a posting may suffer. The instructor reserves the right to remove any discussion messages that display inappropriate language or content.

Online Post Etiquette:

- Offensive language or rudeness will not be tolerated. Discuss ideas, not the person.
- Avoid cluttering your messages with excessive emphasis (stars, arrows, exclamations).
- If you are responding to a message, include the relevant part of the original message in your reply, or make sure to refer to the original's contents so as to avoid confusion;
- Be specific and clear, especially when asking questions.
- Use standard punctuation and capitalization. Using all UPPERCASE characters gives the appearance of shouting and makes the message less legible;
- Remember that not all readers have English as their native language, so make allowances for possible misunderstandings and unintended discourtesies.

Student Learning Resources:

- **Academic and Transfer Advising Services:** Have questions about choosing the right course? Contact an advisor today. Phone: (631) 632-7082 (option 2); email: advising@stonybrook.edu; website: <http://www.stonybrook.edu/commcms/advising/>
- **Amazon @ Stony Brook:** Order your books before classes begin. Phone: (631) 632-9828; email: [Bookstore Liaison@stonybrook.edu](mailto:Bookstore_Liaison@stonybrook.edu); website: <http://www.stonybrook.edu/commcms/bookstore/>
- **Bursar:** For help with billing and payment. Phone: (631) 632-9316; email: bursar@stonybrook.edu; website: <http://www.stonybrook.edu/bursar/>
- **Career Center** The Career Center's mission is to support the academic mission of Stony Brook University by educating students about the career decision-making process, helping them plan and attain their career goals, and assisting with their smooth transition to the workplace or further education. Phone: (631) 632-6810; email: sbucareercenter@stonybrook.edu; Website: <http://www.stonybrook.edu/career-center/>
- **Counseling and Psychological Services:** CAPS staff are available by phone, day or night. <http://studentaffairs.stonybrook.edu/caps/>
- **Disability Support Services:** Students in need of special accommodations should contact DSS. Phone: (631) 632-6748; email: dss@stonybrook.edu; <http://www.stonybrook.edu/commcms/studentaffairs/dss/>
- **Library:** Access to online databases, electronic journals, eBooks, and more!
 - **Library Instruction Website** - <http://library.stonybrook.edu/workshops-this-week-citation-skills-worldcat-and-endnote-the-hsc/>
 - **SBU Library Research Guides and Tutorials** <http://library.stonybrook.edu/research/research-basics/>
- **Registrar:** Having a registration issue? Let them know. Phone: (631) 632-6175; email: registrar_office@stonybrook.edu; <http://www.stonybrook.edu/commcms/registrar/>
- **Writing Center:** Students are able to schedule face-to-face and online appointments. <https://www.stonybrook.edu/writingcenter/>
- **Support for Online Learning** <http://www.stonybrook.edu/commcms/onlineed/student.html>

- Ombuds Office The Stony Brook University Ombuds Office provides an alternative channel for confidential, impartial, independent, and informal dispute resolution services for the entire University community. We provide a safe place to voice your concerns and explore options for productive conflict management and resolution. The Ombuds Office is a source of confidential advice and information about University policies and procedures and helps individuals and groups address university-related conflicts and concerns. <http://www.stonybrook.edu/ombuds/>