



Stony Brook University

<<Mechanical Engineering>>

## Online 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 2020**

**Credit Hours: 3**

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

**Lectures: Tues 05:45-08:40PM (online lectures via Zoom or Google Meet)**

**Instructor Name: Shanshan Yao, Ph. D.**

**Instructor Contact Information:**

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

**Office Hours: Mon 05:00-08:00PM (online via Zoom or Google Meet)**

**Teaching Assistant: Zihan Yu**

**Email: [zihan.yu@stonybrook.edu](mailto:zihan.yu@stonybrook.edu) (Please include MEC450/550 in the subject line, and your full name and SBID# in your emails)**

### **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. In view of COVID-19, lab activities will be replaced with final design project.

### **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:**

This is an online course delivered through a combination of synchronous and asynchronous modes of instruction, in the Blackboard learning management system (LMS). Regular in class lectures and office hours will be replaced by Zoom or Google Meet sessions. The instructor will schedule the meeting ahead of a class and provide you with the link needed to join the meeting. You will need to login with your SBU credentials in order to access these sites to join the classes. Outside regular hours for interaction, students can send emails for the necessary arrangement.

Students must be mindful of all course expectations, deliverables, and due dates. All assignments and course interactions will utilize internet technologies. See "Technical Requirements" section for more information. In Blackboard, you will access course materials, assignments, and resources.

### **How We Will Communicate:**

Course-related questions should be posted in the General Questions Forum in the course Discussion board. My preferred method of contact is via email listed at the top of this syllabus. Please include MEC450/550 in the subject line, and your full name and SBID# in your emails. I 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. You must have an active Stony Brook University e-mail account and access to the Internet. *All instructor correspondence will be sent to your SBU e-mail 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 on the blackboard system. <http://blackboard.stonybrook.edu>

### **Technical Requirements:**

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

1. **Computer and Internet Connection:** This course requires that you have a solid internet connection. We will not be responsible for you not being able to connect to the servers during the exam and no extensions on time will be given. Please do not underestimate the importance of having a reliable computer and internet connection. This is the primary reason why students in the past have suffered a great deal. Please install all the updates on your computer well before an exam.
2. **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.  
**Caution! You will be at a disadvantage if you attempt to complete all coursework on a smart phone or tablet. It may not be possible to submit the files required for your homework assignments.**

3. **Respondus LockDown Browser:** You will need to use this browser to take exams online; please download it from this link:

<http://www.respondus.com/lockdown/download.php?id=772113517>

Get Respondus installed on your PC several days before taking the exam. Watch this brief video to get a basic understanding of LockDown Browser and the webcam feature:

<https://www.respondus.com/products/lockdown-browser/student-movie.shtml>

A student Quick Start Guide (PDF) is also available:

<http://www.respondus.com/products/monitor/guides.shtml>

4. **Microphone and Webcam:** needed for participating in the Voice Thread discussions and Commenting; also needed for on-line exam proctoring.

5. **Zoom:** The Stony Brook University now recommends the use of Zoom web-conferencing software (<https://stonybrook.zoom.us/>) for online classroom instructions. Zoom is available to SBU students. See this page for more information on how to download and use zoom: <https://it.stonybrook.edu/services/zoom>

6. **Scanner or Camera App:** A scanner to scan homework, Exams, etc. as necessary or you can use a smartphone or tablet camera with an app for creating high quality, cropped pdf documents, such as free version of CamScanner (search for it in Google PlayStore or Apple iTunes store). It is your responsibility to ensure that your scans will be legible without being too large in size.

7. **Calculators: Only** the following calculators will be allowed on the midterm and final exam. Use of an unapproved calculator during an exam will result in ejection with a grade of zero. This list of calculators is identical to that allowed for the FE exam, as well as the PE exam; the sooner you become comfortable on one of these calculators, the better. 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. Learn how to work in a team and present the results effectively

### **How to Succeed in this Course:**

- Participation in the online class meetings is required
- Keep abreast of class announcements
- Complete all assignments and reports in a timely manner
- Learn how to use the required technologies and tools

### **Assignments and Expectations:**

**Homework Assignments (30%):** There will be regularly assigned homework problems (due in one week), which will be posted on blackboard or sent by email. Students will submit homework via Blackboard. Homework must be neat, professional, and well organized.

**Exams (2@15% Each):** There will be one closed-book, open-notes in-class exam (Exam I) and one take-home exam (Exam II) on the date to be determined by the instructor. Academic integrity during Exam I will be administered with the aid of the Respondus LockDown browser. Your activity during the exam will be recorded. You are responsible for preparing this system and ensuring that they have a proper testing environment available with suitable hardware, internet, privacy and so on. You may have notes prepared on one 8.5" x 11" doubled-sided sheet of paper and several blank papers for scratch. You need to show them in front of your webcam before the test. You must scan and combine your exam, the notes/cheat sheet, and deviations/scratches into a single file and upload it to Blackboard. Exam II will be in take-home format. You are not allowed to consult with your colleagues for the exam. You must use a blue or black pen rather than pencil for writing in your 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.

**Final Design Project (Proposal 5%+Oral Presentation 10%+Term paper 20%):** The final design project will be conducted in teams of at most 4 students. Each team is expected to develop a mechatronic system application collaboratively to solve a real-world problem. You have to 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 (via Zoom or Google Meet) and submit a comprehensive written report (in .pdf or .docx format).

### Part 3: Course Schedule

*\*\*\*subject to changes\*\*\**

Please note that this schedule is tentative.

<b>Weeks</b>	<b>Topics</b>	<b>Notes</b>
<b>Week 1</b>	Course Introduction, Introduction to Mechatronics, Basic Electric Components	
<b>Week 2</b>	Semiconductor Electronics	
<b>Week 3</b>	Sensors	HW#1 Assigned
<b>Week 4</b>	Sensors, Actuators	HW#1 Due
<b>Week 5</b>	Actuators	HW#2 Assigned
<b>Week 6</b>	System Response and Analysis	HW#2 Due, HW#3 Assigned
<b>Week 7</b>	Analog Circuits, Signal Processing	HW#3 Due, Design Project Assigned
<b>Week 8</b>	Exam I (In Class)	
<b>Week 9</b>	Digital Signals, Logic, and Circuits	Design Project Proposal Due
<b>Week 10</b>	Microprocessors and Microcontrollers	
<b>Week 11</b>	Data Acquisition and Interfacing	HW#4 Assigned
<b>Week 12</b>	Control Architectures	HW#4 Due
<b>Week 13</b>	Mechatronic System Case Study	Exam II (Take-Home)
<b>Week 14</b>	No Class, Thanksgiving Break	
<b>Week 15</b>	Design Project Presentations	
<b>Week 16</b>	No Class, Reading day	
<b>Week 17</b>	No Class, Final exams week	Term Paper Due (Dec 15, 2020)

## 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:

<b>Percentage/Points</b>	<b>Activity/Assignment</b>
30	Homework Assignments
15	Exam I
15	Exam II
5	Design Project Proposal
10	Design Project Presentation
20	Term Paper
5	Attendance
<b>100</b>	<b>Total Possible</b>

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

### **Letter Grades:**

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 in this online course is accrued through your timely participation in discussions and completion of assignments. Failure to participate in required course activities will impact your final grade.

**Late Work Policy:** I will accept late work. Late submission of your homework or report will cost 20% of the points per day. Assignments will not be accepted after they are 3 days late or after solutions are posted. No late submission is allowed for exams, the design project abstract, or the final term paper.

**Make up exams:** If you miss an exam due to unforeseen events, you will have to contact Office of Dean of Students to send me an official notification before I will give you a makeup exam. There will be no make-up exams for reasons that are within your control. Make-up 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](http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/participation_univspnsored_activities.php)

2. University policy on Final Exams:

[http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/records\\_registration/final\\_examinations.php](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](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, 128 ECC Building, (631) 632-6748, or at [sasc@stonybrook.edu](mailto: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-people-physical-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](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](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 web sites that store such materials. This is considered a violation of the copyright protection afforded the

professor. Examples of web sites include [www.coursehero.com](http://www.coursehero.com), [www.chegg.com](http://www.chegg.com), and [www.study.com](http://www.study.com).

## **Online 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. I reserve 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.

**Online Classes Require Better Communication:** It is important to remember that we will not have the non-verbal cues that occur in a face-to-face classroom. I cannot see the confused, frustrated, or unhappy expressions on your face if you encounter problems. **You MUST communicate with me so that I can help.** To make the experience go smoothly, remember that you're responsible for initiating more contact, and being direct, persistent, and vocal when you don't understand something.

**My Role as the Instructor:** As the instructor, I will serve as a "guide" in terms of the Discussion Board. While I will not respond to every post, I will read what is posted, and reply when necessary. Expect instructor posts in the following situations:

- To assist each of you when it comes to making connections between discussion, lectures, and textbook material.
- To fill in important things that may have been missed.
- To re-direct discussion when it gets "out of hand".
- To point out key points or to identify valuable posts.

### **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](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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/>