ESE 315

Control System Design

1. Course Staff and Office Hours

Instructor: Ji Liu
Ji.Liu@stonybrook.edu
211 Light Engineering

Lecture Time: Monday and Wednesday, 5:00pm to 6:20pm

Office Hours: Monday, 1:00pm to 3:00pm
Other hours by appointment

TA: TBA
TA Hours: TBA

Office hours and locations may change. Please check Brightspace for most up-to-date information.

2. Course Description

The course aims to introduce students to basic concepts of classical control theory, such as closed-loop systems, root-locus analysis, Bode diagrams and Nyquist Criterion, and their applications in electrical, mechanical, and electromechanical systems. The students are expected to master the methods for control systems design including basic feedback control and PID control, which have a major application in the design of process control systems for industry.

Pre- or Corequisite: ESE 205
Credits: 3

3. Textbook

"Feedback Control Systems," Charles L. Phillips and John M. Parr, Prentice-Hall. Fifth edition.

4. Course Learning Objectives

Introduce basic concepts in classical control theory and master control systems design including feedback control and PID control.

Students will be able to:

- Understand basic concepts in classic control theory
- Design basic single-input-single-output feedback control systems
- Design and analyze basic PID controllers

5. Student Learning Outcomes

	Student Outcomes	% contribution
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	100
3	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	
3	an ability to communicate effectively with a range of audiences.	
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.	
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	

6. Schedule

The updated course has not been offered yet, but lectures will be held twice a week for 1 hour and 20 minutes each.

Week 1	Introduction; Laplace transforms
Week 2	Laplace transforms
Week 3	Mathematical models for physical systems
Week 4	circuits, mechanical systems, electromechanical systems
Week 5	System Responses to Inputs
Week 6	responses in time-domain and frequency domain; design
Week 7	Closed-loop Systems
Week 8	Stability Analysis
Week 9	Root-Locus Methods
Week 10	lead design; lag design; PID design
Week 11	Frequency Response Analysis
Week 12	Bode diagrams; Nyquist Criterion
Week 13	Frequency Response Design
Week 14	lag and lead compensation; lag-lead compensation

7. Assignments

7.1. Homework Assignments

• Problem sets will be assigned on an approximately every-other-week basis, and will sometimes include MATLAB-based exercises.

• Two or three problems will be selected "randomly" from each assignment for grading. Solutions for problems will be provided to students.

• There will be in-class quizzes held roughly every-other week. Makeups are allowed only if prior notification of valid excuse is provided. Lowest quiz score will be dropped before course grades are computed.

7.2. Late Homework Policy

NO LATE HOMEWORKS will be accepted, HOWEVER each student's lowest homework score will be dropped before course grades are computed.

7.3. Collaboration Policy

Homework assignments are to be completed individually. You may *discuss* them with your classmates. (In fact, you are encouraged to do so.) However, you must write up your own solution individually without any help from any other person.

For example, it is fine if you and a friend discuss a problem together, and then separately work out the details and write your own separate solutions. On the other hand, it is not acceptable to share written solutions with another person or to create the written solutions together. In other words, the work you turn in must entirely be your own personal effort.

If you discuss homework problems with another person in the class, you must write "I discussed this assignment with…" and include the name(s) at the top of the assignment.

8. Grading

Your grade will be based on homework assignments, quizzes, two midterm exams, and a final examination.

Homework Assignments	20%
Quizzes	20%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	20%

9. Academic Honesty

Any academic dishonesty on a written homework or lab will result in a zero grade for the assignment for all parties involved.

All exam work must be entirely your own with no collaboration or outside materials/information. Any academic dishonesty on the midterm exams or the final exam will result in failing the course. The case will be submitted to the College of Engineering's Committee on Academic Standing and Appeals.

10. Electronic Communication Statement

Email and especially email sent via Brightspace is one of the ways the faculty officially communicates with you for this course. It is your responsibility to make sure that you read your email in your official University email account. For most students that is Google Apps for Education (http://www.stonybrook.edu/mycloud), but you may verify your official Electronic Post Office (EPO) address at
http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo

If you choose to forward your official University email to another off-campus account, faculty are not responsible for any undeliverable messages to your alternative personal accounts. You can set up Google Mail forwarding using these DoIT-provided instructions found at
http://it.stonybrook.edu/help/kb/setting-up-mail-forwarding-in-google-mail

If you need technical assistance, please contact Client Support at (631) 632-9800 or supportteam@stonybrook.edu

11. Student Accessibility Support 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. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

12. Academic Integrity Statement

Each student must pursue their 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

13. Critical Incident Management Statement

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.