MEMS 1045 – AUTOMATIC CONTROL

Fall 2020

(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course website and announced in class)

Catalog Description and Objective

This course introduces students to the modelling, analysis and design of control systems, including applications to electromechanical systems. Students will learn how the characteristics such as stability, transient response, and steady-state error can be changed through the implementation of feedback control systems. Students will learn the fundamentals of classical control system designs in the time and frequency domains. In addition, students will gain practical experience in the use of computer-aided analysis tools in the design of control systems for single-input, single-output, linear time-invariant systems. (3 credit hours).

Schedule

Lecture, Room 3-101

Section 1:	Monday	8:15am – 11:00am
Section 2:	Tuesdays	1:50pm – 4:25pm

Computer Labs

Schedule TBA

Instructor

S.C. Fok, Office: Room 222 (Zone 4)

Office Hours: Wednesdays 2:00 – 4:00pm & Thursday 10:00am – 12:00pm
For consultation outside office hours, please send an email to make an appointment
Email: saicheong.fok@scupi.cn

Teaching Assistants:

Section 1 – He Tingting (contact: 1415696650@qq.com)

Section 2 – Li Xiaomin (contact: 1103489384@qq.com)

Textbook

Control System Engineering, 8th edition, Norman S. Nise, Wiley, ISBN – 978-1-119-59435-2

Additional references and supplementary materials will be posted on Blackboard.

Learning Outcomes

After the successful completion of this course students should be able to:

- Analyze system dynamics using mathematical models
- Examine the stability of the dynamic systems
- Evaluate the characteristics of dynamic systems in the time and frequency domains
- Design feedback controllers to regulate the system performance that meets required specification

Grading Policy

Your grade will be based on your overall performance in all assessment items as follows (note: the assessment items may be subjected to change):

ACTIVITIES	PERCENTAGES
Assignments, quizzes, & class participation	20%
Labs & project	20%
Midterm	30%
Final	30%

Note: Students who need to complete the course early will replace the final exam with a special exam in week 14 or 15. Submission requirements (including due dates) for project and assignments will be announced to students in class or on Blackboard. Late submissions will not be accepted unless you have made prior arrangements with Instructors.

Laboratories & Projects

'Safety First': It is critical and your responsibility to understand SCUPI Safety Policy and abide by the lab safety rules. Otherwise, you may not be allowed into the computer lab.

Lab sections will be arranged and announced at a later date. Participation and attendance are mandatory (student must arrive on time).

Tentative Course Schedule:

Week	Text	Topic
2	1.1, 1.3-1.5; 2.1-2.2	Introduction, Review of Laplace transform
3	2.3-2.7	Modelling
4	2.8-2.9; 3.1-3.7	Modelling
5	5.1-5.3	Block diagrams
6		National holidays
7	6.1-6.4	Stability
8	4.1-4.4	Time response
9	4.5-4.8	Time response
10		Midterm
11	7.1-7.5	Steady state error
12	8.1-8.6	Root locus
13	9.1-9.5	Root locus
14	10.1 to 10.10	Frequency response
15	10.1 to 10.10	Frequency response
16	10.1 to 10.10	Frequency response
17		Controller design summary
18		Final exam

The course will cover the analysis and design of feedback controllers in the time and frequency domains. The modelling and design of the control systems will be through guided learning, discussion, assignments, quizzes, project and participation in computer lab exercises. The project will cover modelling, analysis and design of control systems. Assignments will focus on fundamentals to better understand basic concepts.

Class Policies:

Regular class attendance is expected and encouraged. Each student is responsible for all of the material presented in class and in the reading assignments. Assessments will emphasize treatment of material covered in lectures.
In general, no late assignments will be accepted or makeup assessments given. Exceptions will be made for a valid excuse consistent with University Policy. If you cannot attend/submit an assessment or meet a due date, you must contact the instructor immediately. Arrangements will be made for students on a case by case basis. (Failure to contact the instructor will result in a zero on that assessment item.)
Honesty Policy: All students admitted to the SCUPI have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a SCUPI student.

ACADEMIC INTEGRITY

Students in this course will be expected to comply with the Sichuan University's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.