MEMS 1014 – DYNAMIC SYSTEMS

2023-2024 Fall

(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

This course is designed to introduce students to the modeling and analysis of dynamic systems. Topics covered include Laplace transformation; modeling and analysis of physical systems; time and frequency domain analysis; transient and steady state system responses to various excitations; transfer function formulation; and state space model representations. MATLAB and Simulink will be used in this course (3 credit hours).

Prerequisites

- MATH 0280 Matrices & Linear Algebra or equivalent
- MATH 290 Differential Equation or equivalent
- ENGR 0012 Engineering Computing or equivalent
- MEMS 0031 Electrical Circuits or equivalent
- MEMS 1015 Rigid-Body Dynamics or equivalent

Schedule:

Lecture, Room 4-204 Monday 08:15 – 11:00

Instructor:

S.C. Fok **(**Email: saicheong.fok@scupi.cn)
Office: Room 222 (Zone 4)

Office Hours:

Monday 1:00pm – 5:00pm & Tuesday 9:00am – 11:00am
For consultation outside office hours, please send an email to make an appointment.

Teaching Assistant:

Ms. Nancy Li (Email: 2020141520081@stu.scu.edu.cn; Mobile: 17685592912)

Textbook & References

- Ramin S. Esfandiari and Bei Lu: Modeling and Analysis of Dynamic Systems, 3rd Edition, CRC Press, 2018.
- Additional references and supplementary materials will be posted on Blackboard.

Learning Outcomes

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

- Formulate equations of motions for linear mechanical, electrical, fluid, & thermal systems,
- Represent the system model in different forms,
- Solve the system model to get the responses,
- Analyze the system responses in the time and frequency domains,
- Utilize computer tools to analyze system responses.

Grading Policy

Grade will be based on overall performance in all assessment items as follows (note: the assessment items and percentages may be subjected to change):

ACTIVITIES	PERCENTAGES
Quizzes and assignments	10%
Labs and Projects	20%
Midterms	40%
Final	30%

Submission requirements (including due dates) for all assessments will be announced to students in class or on Blackboard. Letter grades are based on SCUPI standard policy.

Tentative Course Schedule (changes will be announced):

Week	Text	Topic
1	Ch. 1 & 3	Course introduction & applied linear algebra
2	Ch. 2	Revision of ordinary differential equations
3	Ch. 4	System Model Representation
4	Ch. 4	System Model Representation
5		Holidays
6	Ch. 4	System Model Representation
7		Midterm
8	Ch. 6	Electrical systems
9	Ch. 5	Mechanical systems
10	Ch. 5	Mixed mechanical systems
11	Ch. 5 & 6	Electromechanical systems
12		Midterm
13	Ch. 7	Fluid and thermal systems
14	Ch. 8	System response
15	Ch. 8	System response
16	Ch. 8	System response
17		Revision or Final exam

The course will cover the modeling and response analysis of mechanical, electrical, fluid, and thermal systems through guided learning, discussion, formative exercises, quizzes, assignments, computer labs and projects. Labs will cover the use of computer tools for analytical and numerical analysis. Projects will enable students to apply the knowledge and computer skills in the modelling and analysis of linear dynamic systems. Quizzes, assignments, and formative exercises will focus on fundamentals so that students can better understand basic concepts.

Class Policies:

- Regular class attendance is expected.
- Assessment items evaluate the student's understanding of material covered in lectures and reading assignments. Submission requirements are clearly stated in all assessment items. No marks will be awarded if the submission requirements are not met.
- Late submissions will not be accepted unless the student has made prior arrangements with Instructors. If a student has a valid reason and cannot submit an assessment item by the deadline, the student must contact the instructor immediately. Failure to do so will result in a zero for that assessment item. If the reason stated is consistent with University Policy, arrangements can be made for the student to resubmit the assessment item (or for alternate assessment method).
- Once the graded assessment item has been returned to the student or solution to the assessment item has been released, no makeup of the assessment will be allowed even if there is a valid reason.
- Challenge to the grading must be made within 7 days after the returned of the assessment item or after the release of the solutions. No challenges to the grading will be entertained after the 7-day period.
- Academic misconduct will not be tolerated. All misconduct will be reported and dealt with by SCUPI.

Honesty Policy: All students admitted to the SCUPI had 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.