DE LA SALLE UNIVERSITY-DASMARINAS
College of Engineering, Architecture, and Technology
Computer Engineering Program

COURSE SYLLABUS

COURSE CODE:	**T-ECET317**
COURSE TITLE:	**Feedback and Control System**
COURSE TYPE:	**Lecture**
COURSE CREDIT:	**3**
PRE-REQUISITES:	**T-ENGM221, T-EEET212/LA**
CO-REQUISITES:	**None**
PROFESSOR:	**Mark O. Montances momontances@dlsud.edu.ph**
CONSULTATION:	**Thu / 1PM to 4PM / Faculty Room**

VISION

A leading Catholic university that inspires excellence and drives innovation towards a just, peaceful, and sustainable society.

MISSION

To champion the human and Christian Education of lifelong learners who value history and culture through responsive and inclusive academic, research, and extension programs.

COURSE DESCRIPTION

This course provides a mathematically rigorous foundation for analyzing and designing feedback and control systems. It focuses on the manual computation and interpretation of complex numbers, Fourier series and transforms, and Laplace and inverse Laplace transforms. The course also includes an overview of essential control systems concepts such as the introduction to control systems, block diagram algebra and transfer functions, frequency response, types of feedback, stability, compensation, and step response analysis. Emphasis is placed on understanding control devices, deriving system equations, and constructing block diagrams of dynamic systems.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

- **CLO1.** Analyze and apply the properties of complex numbers in solving mathematical problems related to control systems.
- **CLO2.** Evaluate signals using Fourier techniques and justify their use in the analysis of frequency-domain behavior in control systems.
- **CLO3.** Formulate and solve control engineering problems using Laplace and inverse Laplace transforms.
- **CLO4.** Examine and interpret the fundamental concepts of control systems including feedback, stability, and response characteristics.
- **CLO5.** Design and assess simple control systems using block diagrams and mathematical models aligned with system specifications.

CLO6. Synthesize mathematical tools and control concepts to develop analytical solutions for real-world system behavior.
CLO7. Construct coherent, well-reasoned written and oral explanations of control system analyses, computations, and designs.

LEARNING PLAN
Learning Outcomes for Midterm Period

Course Learning Outcomes	Topic Learning Outcomes
CLO1: Analyze and apply the properties of complex numbers in solving mathematical problems related to control systems.	TLO1: Define and perform operations on complex numbers including addition, subtraction, multiplication, and division. TLO2: Analyze the role of complex numbers in frequency-domain and impedance calculations within control system contexts.
CLO2: Evaluate signals using Fourier techniques and justify their use in the analysis of frequency-domain behavior in control systems.	TLO3: Compute the Fourier series and Fourier transform of standard time-domain signals. TLO4: Evaluate the suitability of Fourier techniques for control system analysis in terms of frequency response and signal filtering.
CLO6: Synthesize mathematical tools and control concepts to develop analytical solutions for real-world system behavior.	TLO11: Identify mathematical tools such as Laplace, Fourier, and complex numbers used in control engineering. TLO12: Synthesize mathematical methods to solve interdisciplinary control system problems involving signal behavior and system modeling.
CLO7: Construct coherent, well-reasoned written and oral explanations of control system analyses, computations, and designs.	TLO13: Summarize key computational steps used in analyzing control system problems. TLO14: Construct detailed reports and oral presentations that explain system modeling, analysis, and control strategy formulation.

Module No and Learning Outcome (s)	Date	Teaching-Learning Activities / Assessment Strategy Module Activities	Technology Enabler	Onsite	Online	Summative Assessment	Accumulated Hours

Module 0	Week 1
	
	Aug 18 to Aug 23
		• Gospel reading, Reflection, and Prayer
		• **Discussion:**
		  ○ Course Syllabus
		  ○ Course Overview
		  ○ Course Requirement
		  ○ Course Schedule
			Schoolbook
			PDF
			PowerPoint
				1.5	1.5		3

Module 1 CLO1 CLO6 CLO7 TLO1 TLO2 TLO11 TLO12 TLO13 TLO14	Week 2-3 Aug 25 to Aug 30 Sep 1 to Sep 6	• Gospel reading, Reflection, and Prayer • **Discussion:** o Lecture: Introduction to complex numbers, their properties, and operations. o Interactive Problem Solving: In-class exercises on converting between rectangular, polar and exponential forms of complex numbers. o Group Discussion: Analyze real-world control systems problems where complex numbers are applied. • **Enabling Assessment:** o Problem Sets	Schoolbook PDF PowerPoint	3	3		6
	Week 4 Sep 8 to Sep 13	• **Enabling Assessment:** o Quiz #1 (pen and paper)		1.5	1.5		3
Module 2 CLO2 CLO6 CLO7 TLO3 TLO4 TLO11 TLO12 TLO13 TLO14	Week 5-7 Sep 15 to Sep 20 Sep 22 to Sep 27 Sep 29 to Oct 4	• Gospel reading, Reflection, and Prayer • **Discussion:** o Lecture: Introduction to Fourier series, Fourier Integrals and Fourier transforms, including key concepts and components. o Worked Examples: Step-by-step calculations of Fourier transforms for different signals. • **Enabling Assessment:** o Problem Sets	Schoolbook PDF PowerPoint	4.5	4.5		9
	Week 8 Oct 6 to Oct 11	• **Enabling Assessment:** o Quiz #2 (pen and paper)		1.5	1.5		3
	Week 9 Oct 13 to Oct 18	• **Summative Assessment:** o Midterm Exam (pen and paper)		1.5	1.5		3
TOTAL				***13.5***	***13.5***		***27.0***

Learning Outcomes for Final Period

Course Learning Outcomes	Topic Learning Outcomes
CLO3: Formulate and solve control engineering problems using Laplace and inverse Laplace transforms.	TLO5: Solve for the Laplace and inverse Laplace transforms of basic time-domain functions. TLO6: Formulate mathematical models of linear time-invariant systems using Laplace transform techniques.
CLO4: Examine and interpret the fundamental concepts of control systems including feedback, stability, and response characteristics.	TLO7: Describe the basic types and components of control systems including open- and closed-loop systems. TLO8: Interpret the influence of system parameters on feedback, stability, and transient behavior through control system concepts.
CLO5: Design and assess simple control systems using block diagrams and mathematical models aligned with system specifications.	TLO9: Illustrate block diagram representations of control systems and compute corresponding transfer functions. TLO10: Design basic control systems using block diagram algebra and justify the selected configuration based on system requirements.
CLO6: Synthesize mathematical tools and control concepts to develop analytical solutions for real-world system behavior.	TLO11: Identify mathematical tools such as Laplace, Fourier, and complex numbers used in control engineering. TLO12: Synthesize mathematical methods to solve interdisciplinary control system problems involving signal behavior and system modeling.
CLO7: Construct coherent, well-reasoned written and oral explanations of control system analyses, computations, and designs.	TLO13: Summarize key computational steps used in analyzing control system problems. TLO14: Construct detailed reports and oral presentations that explain system modeling, analysis, and control strategy formulation.

Module No and Learning Outcome (s)	Date	Teaching-Learning Activities / Assessment Strategy Module Activities	Technology Enabler	Onsite	Online	Summative Assessment	Accumulated Hours

Module 3 CLO4 CLO5 CLO6 CLO7 TLO7 TLO8 TLO9 TLO10 TLO11 TLO12 TLO13 TLO14	Week 10-11 Oct 20 to Oct 25 Oct 27 to Nov 1	• Gospel reading, Reflection, and Prayer • **Discussion:** ○ Lecture: Overview of control system concepts, including open-loop and closed-loop systems. ○ Independent Learning (Simulation): Use software tools to analyze system stability and response. ○ Independent Learning (Technical Review): Discuss the importance of feedback in various control systems and their real-world applications. • **Enabling Assessment:** ○ Problem Sets	Schoolbook PDF PowerPoint MS Teams	0	6		6
Module 4 CLO3 CLO6 CLO7 TLO5 TLO6 TLO11 TLO12 TLO13 TLO14	Week 12-14 Nov 3 to Nov 8 Nov 10 to Nov 15 Nov 17 to Nov 22	• Gospel reading, Reflection, and Prayer • **Discussion:** ○ Lecture: Detailed explanation of the Laplace methods and its significance in control systems. ○ Tutorial: Guided practice on computing Laplace transforms and inverse Laplace transforms. • **Enabling Assessment:** ○ Problem Sets ○ Quiz #3 (pen and paper)	Schoolbook PDF PowerPoint	4.5	4.5		9
	Week 15 Nov 24 to Nov 29	• **Enabling Assessment:** ○ Quiz #4 (pen and paper)		1.5	1.5		3

Module 3 CLO4 CLO5 CLO6 CLO7 TLO7 TLO8 TLO9 TLO10 TLO11 TLO12 TLO13 TLO14	Week 16 Dec 1 to Dec 6	• Gospel reading, Reflection, and Prayer • **Discussion:** ○ Continuation Lecture Module 3: Overview of control system concepts, including open-loop and closed-loop systems. ○ Block Diagrams, Transfer Function, Frequency Response, Root Locus and Nyquist Criteria, Stability and Compensation, Step Response • **Enabling Assessment:** ○ Problem Sets	Schoolbook PDF PowerPoint	1.5	1.5		3
	Week 17-18 Dec 8 to Dec 13 Dec 15 to Dec 20	• **Summative Assessment:** ○ Midterm Exam (pen and paper)		3	3		6
TOTAL				***10.5***	***16.5***	***0***	***27.0***

GRADING SYSTEM

Midterm	Percentage	Finals	Percentage
Enabling Assessment Problem Sets Quizzes	60% 30% 30%	Enabling Assessment Problem Sets / Project Quizzes	60% 30% 30%
Summative Assessments Midterm Examination	30%	Summative Assessments Final Examination	30%
Attendance	5%	Attendance	5%
Class Participation	5%	Class Participation	5%
Total	100%	Total	100%

Overall Final Grade = $\frac{\text{Midterm + Final}}{2}$

COURSE POLICIES AND REQUIREMENTS

1. **Office365 Activation.** Please ensure that your Office365 account is working. Your Office365 account is needed to access both Schoolbook and MS Teams where your asynchronous and synchronous classes will be held.
2. **Enrollment in an E-Class.** You will automatically be enrolled in your e-class which is based on your enrollment data.
3. **Traditional Blended Learning Model.** This course adopts the enriched virtual blended model. This means that there will be a mix of face-to-face and asynchronous activities. Under the traditional blended learning, 50% of the weekly class is delivered face-to-face, while the remaining 50% is online.
4. **Online Asynchronous Sessions**.
    a. **Schoolbook (SB).** Schoolbook shall be the only platform for asynchronous sessions.
    b. **Modules.** Modules are self-paced learning resources for asynchronous sessions. These can be accessed in Schoolbook.
    c. **References.** Each page section may contain uploaded references. These learning resources may be downloaded.
    d. **Asynchronous Activities.** You are expected to read the modules as soon as they are uploaded. The learning content of the modules complement the online synchronous and face-to-face sessions.
    e. **Asynchronous Engagement.** Your activities in the course can be tracked by your professor. This includes the time you spend in reading the lessons and answering the assessments.
    f. **Schoolbook Forum.** All general concerns about the lessons and assessments in asynchronous sessions must be posted in the Schoolbook Forum. Response shall be made by your teacher within 48 hours.
    g. **Schoolbook Messaging.** This shall be the mode of communication for private and/or confidential communications. Response shall be made by your teacher within 48 hours upon receipt of the same unless it falls on weekends or holidays, which shall be handled promptly the following working day.

5. Onsite / Face-to-face (F2F) Sessions.

a. **Face-to-face engagement.** Your engagement in face-to-face classes is graded based on your class participation.
b. **Classroom.** F2F classes shall be held at the classroom indicated in your Certificate of Registration. Should there be changes in the classroom venue, information will be given in advance.
c. **Gospel Reading and Prayer.** Each F2F session shall start with a Gospel reading and prayer. Your teacher may assign you, in advance, to do this.
d. **F2F Meeting Schedule.** The meeting schedule shall follow the time indicated in your official registration. The dates of F2F meetings are identified in the learning plan.
e. **Attendance.** Attendance in F2F meetings is required.
f. **Tardiness.** A student who came 1 minute to 15 minutes after the start of the face-to-face meeting is considered late. Three tardy attendance is equivalent to 1 absence.
g. **Absence.** A student is considered absent 15 minutes after the official class schedule.
h. **Excuse from F2F classes.** Students are excused in the F2F classes based on the provisions in the latest version of the Student Handbook.
i. **Uniform.** Wearing of uniform is optional. Civilian attire should follow the policy on dress code as stipulated in the latest version of the Student Handbook.

6. Assessment and Grading System.

a. **Formative assessments.** These are ungraded assessments. These may be considered as practice assessments that leads towards achieving outcomes without fear of receiving a failing grade.
b. **Enabling assessments.** These will comprise most of your graded assessments. These are designed to achieve topic learning outcomes, that leads towards achieving the course learning outcomes. Only one enabling assessment shall be allowed during the week. Please pay attention to the duration and number of attempts. As a general rule, quiz-type enabling assessments shall be open for only a minimum of 24 hours, while output-based enabling assessments shall be open for at least 6 days.
c. **No. of Attempts.** All online enabling assessments shall have a maximum of 3 attempts only. Summative assessments shall be given a maximum of 2 attempts.
d. **Summative assessments.**
    i. There shall be two summative assessments (midterm and final exams) for the entire semester. These are designed to achieve the course learning outcomes.
    ii. Online summative assessments shall be uploaded on SB and shall be accessible for a minimum of 1 day for quiz type and a minimum of 6 days for output-based assessments.
    iii. Summative assessment maybe given through online or face-to-face.
    iv. Output-based summative assessment shall be given to students at least fifteen days prior to scheduled Summative Exam Week.
e. **Lifeline.** Only students with (1) valid reason as stated in the Student Handbook and IRR, and (2) given their proof of excuse on or before the next synchronous/F2F session, shall be given a lifeline on the enabling and summative assessments.
f. **Rubric.** All online non-quiz or non-discrete types of assessment (essay, drop box, output-based, etc.) shall have a rubric or criteria for rating the students' tasks. A student may refuse to answer these types of assessment in the absence of a rubric or criteria for grading, and the assessment shall be deemed invalid and shall not be part of the student's grades.

g. **Grading.** All online assessments should be checked and graded by the teacher before the submission of midterm and final grades.
h. **Gradebook.** Students can see the breakdown of grades in their Assessment tab.

7. Independent Learning.

a. Schedule. There is one schedule of Independent Learning week.

8. Data Privacy.

a. **On camera.** Your teacher may require you to engage in synchronous session by turning on your camera. These type of engagement activities include, but not limited to the following: chat participation, participating by audio/voice, participation in poll and games, clicking links, and other online engagement activities.
b. **Recording of synchronous session.** Your teacher shall inform you, at the start of the meeting, that the synchronous meeting is being recorded.
c. **Access to the MS Teams recording.** Only students who are officially enrolled shall be part of the MS Teams and have access to all the resources including the recording. Students are not allowed to record the meetings. Students are not allowed to download the recordings. Screen recording is not allowed.
d. **Guests.** Inviting people, that are not part of the class, in synchronous meetings is strictly prohibited, unless approved by the subject teacher.
e. Posing as another person during a synchronous activity is strictly prohibited.

9. Copyright and Plagiarism.

a. Using of any illegally obtained software and other technology tool is strictly prohibited.
b. Students are encouraged to use their original photos, videos, and other resources. Otherwise, students can use royalty-free resources or embed the sources in their submissions to avoid copyright infringement and/or plagiarism.
c. Giving of password to Schoolbook and Office 365 is strictly prohibited. Likewise, accessing Schoolbook and Office 365 account other than the students' personal account is also strictly prohibited. Violating students will be reported to the Student Welfare and Formation Office (SWAFO).
d. This subject shall abide by the policies pertaining to intellectual property, copyright, and plagiarism as stipulated in latest edition of the Student Handbook.
e. Any plagiarized work, whether in part or full, shall mean a grade of 0.0 for the assessment.

10. This course shall abide by any institutional policies that may be released after the approval of this syllabus. Any such policy shall be posted within the e-class at the forums section, news feed. It will also be briefly discussed during the soonest synchronous meeting.

REFERENCES

Online References

Call number or e-provider	Reference Material
YouTube	**Understanding Control Systems, Part 1: Open-Loop Control Systems https://www.youtube.com/watch?v=FurC2unHeXI**

YouTube	**Understanding Control Systems, Part 2: Feedback Control Systems https://www.youtube.com/watch?v=5NVjlli9fkY**
YouTube	**Understanding Control Systems, Part 3: Components of a Feedback Control System** https://www.youtube.com/watch?v=u1pgaJHiiew

On-Site References

Accession number	Reference Material
2196259	**Basu, Saurabh Ahmad, Reyaz(2017) Control System, Ed.: First edition. New Delhi : Laxmi Publications Pvt Ltd.**
2228696	**Jain, S. P. (2018). CO-RE of Electrical Engineering,ebook, Ed.: First edition. Bengaluru : Laxmi Publications Pvt Ltd**
1918012	Singh, Yaduvir Verma, Mandhir (2016), Fundamentals of Electrical Engineering ebook, Laxmi Publications Pvt Ltd.
1356715	Alexander, Sherri (2016), Computer Vision and Simulation : Methods, Applications and Technology, Hauppauge, New York : Nova Science Publishers, Inc.
1453457	**Santos, Wendy (2016), Fuzzy** Control Systems **: Design, Analysis and Performance Evaluation, Hauppauge, New York : Nova Science Publishers, Inc.**

Prepared by:

Mark O. Montances

Electronics Engineering Program

Noted by:

Sandra M. Tirol

Computer Eng'g Assistant Chair

Endorsed by:

Engr. Gilba Joy P. Domingo

Chair, Engineering Department

Approved by:

Dr. Ma. Estrella Natalie B. Pineda

Dean, CEAT