

Course Description Form

1. Course Name:
Nonlinear Systems
2. Course Code:
CSE-C4307
3. Semester / Year:
2 nd Semester
4. Description Preparation Date:
14/2/2024
5. Available Attendance Forms:
Personal
6. Number of Credit Hours (Total) / Number of Units (Total)
30/
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Taghreed M. MohammadRidha Email: taghreed.m.ridha@uotechnology.edu.iq
8. Course Objectives

Course Objectives	<ul style="list-style-type: none"> • Provide knowledge in nonlinear systems and common nonlinear elements in control systems. Provide the ability to understand the characteristics of nonlinear systems like equilibria and oscillations (limit-cycles). • Identifying classical methods for analysis of nonlinear dynamical systems, such as phase-plane analysis and the stability analysis using Lyapunov Theory.
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9. Teaching and Learning Strategies

Strategy	<p>1- Introduce the theory of the related method. Solve several examples to reinforce the method of solution.</p> <p>2- Students are asked to solve homework problems related to this topic.</p> <p>3- Discussing solutions and resulting problems</p> <p>4- The above points are accomplished through homework, and documented reports.</p>
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4	a, e, h	Introduction to Nonlinear Systems	Live presentation and homework	Discussing and evaluating reports

3-4	4	a, e, h	Nonlinear System Behavior	Live presentation and homework	Discussing and evaluating reports
5-6	4	a, b, c, e, k	Nonlinear Systems Analysis using Phase Plane	Live presentation and homework	Exams and Homework
7-8	4	a, b, c, e, k	Constructing phase portraits for Nonlinear Systems	Live presentation and homework	Exams and Homework
9-10	4	a, b, c, e, k	Fundamentals of Lyapunov Theory for Autonomous Systems.	Live presentation and homework	Discussing and evaluating reports
11-12	4	a, b, c, e, k	Lyapunov's Linearization Method	Live presentation and reports	Discussing and evaluating reports
13-15	6	a, b, c, e, k	Lyapunov's Direct Method	Live presentation and reports	Discussions and exams.

11. Course Evaluation

20% documented exam
5% Quizzes
5% reports and homework

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

1) J. E. Slotine and W. Li, "Applied

Recommended books and references (scientific journals, reports...)	Nonlinear Control”, Prentice-Hall, Inc., USA, 1991. 2) H. Khalil, “Nonlinear Systems”, 3rd Edition, Prentice Hall,2002. 3) H. J. Marquez, “Nonlinear Control Systems Analysis and Design”, John Wily and Sons, USA, 2003.
Electronic References, Websites	