

Computer Control of Processes

ECH 6326 Section 1012

Class Periods: M W F Period 9, 4:05 – 4:50 PM

Location: 330 Larsen

Academic Term: Fall 2019

Instructor:

Name: Oscar D. Crisalle
Email: Crisalle@che.ufl.edu
Office Phone Number: 352 392 5120
Office Hours: Open-door policy (drop in unannounced). Appointments are also welcome.

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- No TA is assigned to this course.

Course Description

Introduction to digital computers, sampled data systems and Z-transforms, control of multiple input-multiple output systems, optimal control, state estimation and filtering, and self-tuning regulators. Credits: 3

Course Pre-Requisites / Co-Requisites

None

Course Objectives

Clearly state the learning objectives of the course, and how those objectives will be accomplished (give a list of specific actions or course elements).

Materials and Supply Fees

Not applicable.

Required Textbooks and Software

- Notes developed by the instructor. Available in the Canvas site.
- MATLAB and Simulink software by Mathworks (available at the UF Computing labs and as online UF Apps)

Recommended Materials (Optional)

- **Modern Control Engineering**, by Katsuhiko Ogata and Yanzhan Yang, London (2002). (UF library: SCIENCE LIBRARY: TJ213.028 2002).
- **Automatic Control Systems**, by Benjamin C. Kuo and Farid Golnaraghi, Englewood Cliffs, (1995). (UF library: SCIENCE LIBRARY: TJ213.K8354 1995).
- **Multivariable Feedback Control: Analysis and Design**, by Sigurd Skogestad and Ian Postlethwaite, John Wiley & Sons Inc. (2005). (UF library: SCIENCE LIBRARY: Not available).
- **Advanced Control Systems Design**, by Ching-Fang Lin, in *Prentice Hall Series in Advanced Navigation, Guidance, and Control and their Applications*. Prentice Hall (1993). (ISBN 0130063053).
- **Advanced Control System Design**, by Bernard Friedland, Prentice-Hall, (1995).
- **Advanced Modern Control System Theory and Design**, by Stanley M. Shinnars, John Wiley & Sons, (1998)
- **Linear System Theory and Design**, by Chi-Tsong Chen, Oxford University Press (1998).

Course Schedule

- Week 1: Introduction
- Week 2: The State-Space Model
- Week 3: The Linear State Space System
- Week 4: Modeling Physical Systems
- Week 5: Review of Linear Algebra
- Week 6: The Matrix Exponential Function
- Week 7: The Variation of Parameters Formula
- Week 8: Introduction to Computer Simulation
- Week 9: The Matrix Transfer Function Representation
- Week 10: Realization Theory
- Week 11: Controllability and Observability
- Week 12: Stability
- Week 13: Feedback Control Design
- Week 14: State Estimation
- Week 15: Course Review

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance. Attendance to lectures is required. Repeated absences will lead to a reduction of the final grade in the class, and in some cases it will lead to a failing grade at the discretion of the instructor. Class roll-calls will be taken.

Make Up. Make up allowed for missed assignments, projects, homework, quizzes and exam allowed at the discretion of the instructor.

Telephone Policy. All portable telephone and beepers should have their ringers turned off during class. As a courtesy to the other students and to the instructor, and to prevent interruption of class, the students should not answer any incoming calls. If a student is expecting an emergency call that may arrive during class, it is required that whenever possible he/she notify the instructor about the situation before class.

Absences. Excused absences must be in compliance with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets	100	0 %
Quizzes	100	0 %
Midterm Exam	100	30 %
Final Project	100	30 %
Final Exam	100	40 %
		100%

Grading Policy

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.ua.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.