FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department Ocean & Mechanical Engineering

College CECS

*(To obtain a course number, contact **erudolph@fau.edu**)*

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

Prefix EML

Number 6317

(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)
Lab Code

Course Title
Advanced Control Systems

Credits *(Review Provost Memorandum)*
3

Effective Date *(TERM & YEAR)*
Spring 2018

Grading *(Select One Option)*
Regular (●)
Sat/UnSat ( )

Course Description *(Syllabus must be attached; see Guidelines)*
Control design applications via root locus and frequency based approaches will be explored theoretically and applied to laboratory systems. Nonlinear sliding mode control theory will be introduced and applied to a lab system. Each student will also explore an individual project based on control of a system.

Prerequisites
EML 4432 Dynamic Systems, or equivalents

Corequisites

Registration Controls *(Major, College, Level)*
Eng., Science, Math, Physics
Graduate, Senior

Prerequisites, Corequisites and Registration Controls are enforced for all sections of course

Minimum qualifications needed to teach course:
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)

List textbook information in syllabus or here
Modern Control Engineering, 5th Edition, K. Ogata, Prentice Hall, 2010, ISBN-13:978-0136156734; Nonlinear Systems, 3rd Edition, Khalil Hassan, Prentice Hall, 2002, ISBN -13:978-0130673893

Faculty Contact/Email/Phone
Erik Engeberg, Ph.D. / eengeberg@fau.edu / x70530

List/Attach comments from departments affected by new course
Computer & Electrical Engineering & Computer Science

Approved by	*Date*
Department Chair	4/24/17
College Curriculum Chair	4/24/17
College Dean	4/25/17
UGPC Chair	4/30/17
Graduate College Dean	8/31/17
UFS President	
Provost	

Email this form and syllabus to UGPC@fau.edu one week before the UGPC meeting.

Anastasia Calnick

From: Tsung-Chow Su
Sent: Thursday, April 20, 2017 11:28 AM
To: Zvi Roth
Cc: Anastasia Calnick
Subject: Re: Please provide support letter for Eric's course

Dear Zvi,

Thanks for your support.

Best

Joe

Sent from my iPhone

On Apr 20, 2017, at 11:17 AM, Zvi Roth <rothz@fau.edu> wrote:

> Dear Dr. Su,
> I strongly support Dr. Engeberg's proposed Control Systems course. None of the other control courses that we offer in the college has such hands on lab and project design activities for the students.
> Regards,
> Zvi
>
> Dr. Zvi S. Roth
> Professor
> Department of Computer & Electrical Engineering & Computer Science
> Florida Atlantic University
> Engineering East Building, Room 519
> 777 Glades Road
> Boca Raton, FL 33431
> 561-297-3471
>
> ---
>
> **From:** Tsung-Chow Su
> **Sent:** Thursday, April 20, 2017 10:48:39 AM
> **To:** Zvi Roth
> **Subject:** Please provide support letter for Eric's course
>
> Dear Zvi,
>
> Would you please support this course ?
>
> Thanks
>
> Best regards

1. Course title/number, number of credit hours

EML 6317 Control Systems	3 credit hours

2. Course prerequisites, corequisites, and where the course fits in the program of study

Prerequisites: Permission of Instructor; Dynamic Systems, or equivalent
Mechanical Control Systems or equivalent

3. Course logistics

Term: Spring
Class hours: 3 hours
Class location and time: TBD

4. Instructor contact information

Instructor's name	Dr. Erik Engeberg
Office address	Engineering West; Bldg. 36, Room 178
Office Hours	TBD
Contact telephone number	561-297-0530
Email address	eengeberg@fau.edu

5. TA contact information

TA's name	N/A
Office address	
Office Hours	
Contact telephone number	
Email address	

6. Course description

Control design applications via root locus and frequency based approaches will be explored theoretically and applied to laboratory systems. Nonlinear sliding mode control theory will be introduced and applied to a lab system. Each student will also explore an individual project based on control of a system.

7. Course objectives/student learning outcomes/program outcomes

Course objectives	This course introduces graduate students to an up-to-date account of the principles underlying the design, analysis, synthesis, and applications of control systems
Student learning outcomes & relationship to ABET a-k objectives	Covers objectives (a, e, g, k).

8. Course evaluation method

• Labs	25%
• Projects	40%
• Midterm Exam	15%
• Final Exam	20%

9. Course grading scale

Grading Scale:
90 and above: "A", 87-89: "A-", 83-86: "B+", 80-82: "B", 77-79 : "B-", 73-76: "C+", 70-72: "C", 67-69: "C-", 63-66: "D+", 60-62: "D", 51-59: "D-", 50 and below: "F."

10. Policy on makeup tests, late work, and incompletes

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements

Late work is not acceptable.

Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation incomplete grades will not be given.

11. Special course requirements

N/A

12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

13. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Student Accessibility Services (SAS) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all SAS procedures.

14. Honor code policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf

15. Required texts/reading

- Modern Control Engineering, 5th Edition, K. Ogata, Prentice Hall, 2010; ISBN-13:978-0136156734
- Nonlinear Systems, Hassan Khalil, 3rd Edition, Prentice Hall, 2002; ISBN-13:978-0130673893

16. Supplementary/recommended readings

Control Systems Engineering, 7th Edition, Norman S. Nise, Wiley

17. Course topical outline, including dates for exams/quizzes, papers, completion of reading

1. Week 1: Motor Modeling, Gear trains, Coulomb Friction
2. Week 2-3: Root locus-based controller design methods. Begin Lab 1.
3. Week 4: First project presentations by students.
4. Week 5-6: Frequency-based Controller Design Methods. Begin Lab 2.
5. Week 7-8: Introduction to state space equations Begin Lab 3. Midterm at end of week 8.
6. Week 8-11: Introduction to sliding mode control with applications.
7. Week 12-14: Control Systems Applications to modern systems.
8. Week 15: Final semester-long project presentations.
9. Week 16: Final exam

Note: the midterm will be during week 8 of the semester and the final exam will be during the regularly scheduled time at the end of the semester.

Lab 1 description: Model and control a double DC motor system working collaboratively to control the angle of a torsional spring load.

Lab 2 description: Experimentally ascertain the frequency response of the dual DC motor lab systems.

Lab 3 description: Estimate the transfer function of the DC motor lab system and use frequency based methods to design controllers to satisfy design criteria.

Semester Project: This will be a semester-long project that the student will explore based on control of a system. The project will consist of an initial presentation, a final presentation, and a final project report. The topic of the project will be mutually agreed upon by the Professor and student with the project deliverables defined prior to this initial presentation, which will occur during week 4 of the semester. The final presentation will occur during week 15 of class. The final report will be due at the time of the final exam.