

## ENME605: Advanced Systems Control Fall 2020

**Instructor:** Jin-Oh Hahn ([jhahn12@umd.edu](mailto:jhahn12@umd.edu))

- Office: 2104C Glenn L. Martin Hall
- Office Hours: Wednesdays 1:45p-2:30p or by Appointment

### Reference Textbooks

- Control Systems Engineering (Norman Nise)  
[ENME462 Textbook]
- Control System Design: An Introduction to State-Space Methods (Bernard Friedland)  
[Available @ University Bookstore]
- Modern Control Systems (Dorf & Bishop)

### Course Description

This is the first graduate-level course on dynamic systems and control. The primary focus of the course is given to state-space and frequency-domain approaches to the analysis and design of linear control systems.

### Tentative Topics

1. State-Space Representation and Solutions to State-Space Equations
2. Dynamics of Linear Systems
3. Controllability and Observability
4. State Feedback Control
5. Observers
6. Separation Principle and Compensator Design
7. Robust Control Design
8. Linear Quadratic Optimal Control
9. Kalman Filtering

### Grading

- Assignments 70% (<=10 Problem Sets)
- Individual Project 30%

Individual project will consist of a 1-page proposal/literature review (5%) and a final report (max. 5 pages; 25%).

#### Proposal/Literature Review (Deadline 11/20/2020)

Choose a topic of your interest relevant to the scope of the course: (i) state-space modeling and analysis of linear control systems, (ii) design and simulation of linear control systems, (iii) design and simulation of state observers and estimators, etc. Succinctly present the problem, and then describe the plans regarding the tasks to be accomplished and the results to be provided in the report.

#### Final Report (Deadline 12/14/2020)

The final report must include, in no more than 5 pages (excluding figures and tables; figures and tables combined are limited to 5), problem statement and formulation, solution method, results, and discussion.

### **A Note Regarding Plagiarism**

All students are expected to be fully aware of the University rules governing plagiarism, both the definition of plagiarism and its consequences for breaking the rules. A zero-tolerance policy will be in effect for any students plagiarizing in ENME808. All material turned in to the instructor must be independent work, including homework assignments, paper reviews and individual project reports.

### **Academic Integrity**

The University of Maryland has a Code of Academic Integrity, available on the web at:

<https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf>

We assume that students are familiar with the principles of the Code, which prohibits cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. Students who have questions or concerns about these issues should contact the instructors or view the website for additional information.

### **Statement on Civility**

The University of Maryland and the A. James Clark School of Engineering is expected to be a diverse, open, and tolerant environment within which all ideas, whether popular or not, may be freely discussed without rancor. The instructor of this course is committed to creating an open and accepting environment in which diversity, unique perspectives, and others' world views are respected. Demeaning, intimidating, or threatening behavior is unacceptable and contrary to our basic values and may violate campus policies on student conduct and behavior. As citizens of the university, we take the lead in producing, and take pride in sustaining, an environment that is characterized by tolerance, respect, and civility. This is the hallmark of a university and college that welcomes and values diverse perspectives, intellectual pluralism, and the free and open exchange of ideas.

### **Equity, Diversity, and Inclusion**

The University of Maryland, College Park affirms its commitments to a policy of eliminating discrimination on the basis of race, color, creed, sex, gender identity or expression, sexual orientation, marital status, personal appearance, age, national origin, political affiliation, physical or mental disability, or on the basis of the exercise of rights secured by the First Amendment of the United States Constitution. This Code is established to prevent or eradicate such discrimination in accordance with due process within the Campus community. In doing so, the Campus recognizes that it must strive actively and creatively to build a community in which opportunity is equalized. To read the entire policy, see appendix A in the undergraduate catalogue. For more information: [www.president.umd.edu/policies/vi100b.html](http://www.president.umd.edu/policies/vi100b.html).