EENG307: Introduction to Feedback Control Systems

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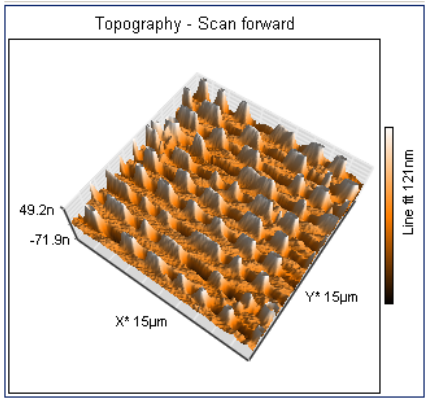
Outline

Examples of Dynamic Systems We Can Control



Source: www.fiat.it

Outline

Course Info

- Course Webpages:
  Canvas (http://elearning.mines.edu/). All current CSM students should have a Canvas account, and students registered for this course will be automatically enrolled. Check with CCIT if you do not have an account. Canvas will be used to post homework assignments, submit homework assignments, view grades, and other section-specific material.

Instructor

- Section B - MWF 10:00 - 10:50 in Brown Building W280
  - Instructor: Elenya Grant
  - Office: BB314B
  - Office hours: MWF 9:00 - 9:50
  - Email: elenyagrant@mines.edu
- Section C - MWF 12:00 - 12:50 in Marquez Hall 326
  - Instructor: Hisham Sager
  - Office: BB327A
  - Office hours: Tuesday/Thursday 9:30 - 11:00 via Zoom (see Canvas for link)
  - Email: hsager@mines.edu
- Section D - TR 2:00 - 3:15 in Alderson Hall 133
  - Instructor: Kathryn Johnson
  - Office: BB327F
  - Office hours:
    - Monday 1:00-2:00 via Zoom https://mines.zoom.us/j/92708305575
    - Tuesday 3:30-4:30 in BB327F
    - Thursday 1:00-1:50 in BB327F
  - Email: kjohnson@mines.edu

The Textbook (Optional)

Gene F. Franklin, J. David Powell, Abbas Emami-Naeini, *Feedback Control of Dynamic Systems*, 7th Edition. ISBN 0133496597.

Objectives

Students will be able to:

- Develop mathematical models for linear dynamic systems (mechanical, electrical, fluid, and/or thermal).
- Use time domain and frequency domain tools to analyze and predict the behavior of linear systems.
- Use time domain and frequency domain techniques to design feedback compensators to achieve a specified performance criterion.
- Use MATLAB for system analysis and design.

Letter Grades

Letter grades will be assigned as stipulated in the undergraduate bulletin http:/catalog.mines.edu/undergraduate/undergraduateinformation/undergraduategradingsystem/

- A (includes A+) $\geq$ 93
- A- $\geq$ 90
- B+ $\geq$ 87
- B $\geq$ 83
- B- $\geq$ 80
- C+ $\geq$ 77
- C $\geq$ 73
- C- $\geq$ 70
- D+ $\geq$ 67
- D $\geq$ 63
- D- $\geq$ 60
- F $<$ 60

Available Points

Unit	Item	Grading
1	HW1, HW2, HW1-2 Make-up	Best 2 of 3
	AQ1	7.5 pts
2	HW3, HW4, HW3-4 Make-up	Best 2 of 3
	AQ2	7.5 pts
3	HW5, HW6, HW5-6 Make-up	Best 2 of 3
	AQ3	7.5 pts
4	HW7, HW8, HW7-8 Make-up	Best 2 of 3
	AQ4	7.5 pts
1-4	Project Including Preliminary Submissions	30 pts
	Final AQ (make-up for AQ1, 2, 3, or 4)	7.5 pts
Total		100 pts

Homework

- Each homework is worth 5 points.
- Submit your homework on Canvas as a single .pdf file, readable, with all pages right side up. Files that are not submitted correctly may not be graded.
- So that solutions can be posted to all course sections as soon as the due date, *no late homework is accepted for any reason.*
- You can make up for one missed homework per unit by completing the Homework Make-up Quiz posted on Canvas. *Note that HW Make-up quizzes are different from Assessment Quizzes (AQ's).*
  - Each Homework Make-up Quiz is worth 5 points.
  - You may take each Homework Make-up Quiz 3 times; your highest score will count.
- You Homework Score for each of the 4 units will include the **highest 2 of 3 scores** from the group of
  - Homework (2) and
  - Homework Make-up Quizzes (1).
- HW grading reflects the fact that homework is primarily for practice, not assessment.

Assessment Quizzes

- Each of the four units is assessed via a Canvas-based Assessment Quiz (AQ).
- Though both can be found on Canvas, *AQ's are different from HW Make-up quizzes*. HW Make-up quizzes are optional, whereas AQ's are not.
- There is also an end-of semester AQ that can be used to replace your lowest score from AQ1, AQ2, AQ3, and AQ4. This final AQ may contain questions from the entire semester.

Exams

- In an effort to prioritize authentic learning and assessment via a semester project, there are no exams in this class.

Project

- There will be one team-based semester project worth 30% of your final grade.
- There will be three preliminary due dates for the project to support your learning, by providing an opportunity for feedback, by helping you to practice concepts throughout the semester, and by discouraging last-minute project attempts.

Typo Bonus Points

- If you find a typo in the notes, the first to report it in the Canvas Discussion board titled “Typo Bonus Points” gets 0.5 bonus points. You can earn up to 4 bonus points. For simplicity, on Canvas, all bonus prep points are added to the HW score for Unit 1, no matter when they are earned. This score can therefore be > 100%.

The COVID Smart Classroom (2022) - 1

As new variants of COVID-19 continue to evolve, all campus community members are asked to make thoughtful choices about their health and be mindful that those choices will affect our whole community.

- Anyone experiencing COVID-19 symptoms should wear a mask, not report to work or attend classes, and get tested as soon as possible.
- Anyone experiencing respiratory symptoms, even after a negative COVID test, should remember there are many respiratory viruses circulating in our community. Please be considerate of others and wear a mask whenever you have any cold-like symptoms.
- Masking is one of the most effective ways to protect yourself and others, especially in indoor settings when community transmission levels are high. Please continue to respect an individual's decision to wear a mask even if it is not required. Masks are still required in the Student Health Center.
- Wash your hands frequently using soap/water or hand sanitizer.

The COVID Smart Classroom (2022) - 2

If you test positive for COVID-19 (rapid antigen or PCR test):

- **Stay home for a minimum of five (5) days** and isolate yourself from others at home, as directed by the CDC.
- **Communicate with your professors via email or the excused absence form** that you are ill or have tested positive for COVID-19. You should communicate this 5 day absenteeism to you faculty OR through the Student Life Excused Absence Process. Students can complete the Excused Absence here: https://www.mines.edu/student-life/forms/personal-excused-absence/.
- For additional support, please reach out to one of the many resources on campus:
  - Academic support: Email CASA at casa@mines.edu.
  - Student Life Office: Excused absence (only if you must be away from class for more than three days).
  - Experiencing a mental/emotional challenge? Email Student Outreach & Support (SOS) at care@mines.edu or fill out a SOS Referral.

Summary of Absences and Accommodations

Recognizing that illness and life circumstances happen, we have designed this course to offer you ample opportunities to practice and demonstrate your mastery of the course material without requiring you to be in the classroom every day. These are summarized by the following:

- All assignments except the two in-class oral project status reports (which are not directly graded) are submitted via Canvas.
- Assignments primarily intended for you to learn the material through practice (HW and HW Make-Up Quizzes) are graded on a best 2 of 3 method for each unit.
- Assignments primarily intended for us to assess your learning (AQs) are also submitted via Canvas. You will have an opportunity to make up one of these at the end of the semester.
- All classes derive from the Lecture Articles we have written for this class, and all Lecture Articles (and additional resources) are available on Canvas.

Classroom Rules

- Please help your classmates focus!
- Keep unrelated discussions to a minimum.
- Quiet food and drink only - no potato chips, do not open sodas during class.
- Participate in class-room exercises.
- If you have an important call, please take it outside the classroom.

Academic Honesty

For this course, the following rules should be followed:

- All students must turn in individual homework (unless otherwise stated) and they must understand what they turn in.
- Copying of solutions without understanding them is not allowed; if a student copies a solution and cannot explain it adequately this is considered academic dishonesty.
- For computer exercises, each student is expected to generate his/her own solution (i.e. one cannot simply copy another person's computer solution and modify it slightly to make it look like it is your own work).
- During Assessment Quizzes, students must do 100 percent of the work on their own.
- The nominal penalty for academic dishonesty is an 'F' in the course.

MATLAB

- A tool for technical computing with a programming like interface. (You should have already taken Fortran, C, or Java.)
- Easy access to highly optimized numerical methods.
- You are responsible for becoming familiar with the MATLAB interface. If you are unfamiliar with MATLAB, we would recommend purchasing an introductory text, or make use of the myriad tutorials on the internet, such as https://www.mathworks.com/training-schedule/matlab-onramp.html
- You will also find some introductory information about MATLAB in your textbook at the end of most chapters and in the appendix.
- Instructions for accessing MATLAB from your laptop (called remote access) can be found here: http://inside.mines.edu/Matlab.

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Resources

There are numerous resources available to help you learn the course material. They include:

- Lectures (in class)
- Electronic lecture files (available on Canvas), with self quizzes at the end of each lecture
- Homework problems and solutions (posted on Canvas)
- Quizzes (posted on Canvas)

More Resources!

- Your professors (office hours, email)
- Students are encouraged to seek academic support if struggling with course material. Information on Tutoring, Academic Excellence Workshops, and Academic Coaching can be found at http://academicservices.mines.edu.

Disability Support Statement:

The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and I have received your letter of accommodations, please contact me at your earliest convenience so we can discuss your needs in this course. For questions or other inquiries regarding disabilities, I encourage you to visit `http://disabilities.mines.edu` for more information.

Title IX Statement:

Title IX is a federal law that protects individuals from discrimination based on sex and gender in educational programs or activities. Colorado School of Mines is committed to providing a campus community free from gender-based discrimination. Gender-based discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited within the Mines campus community. If these issues have impacted you or someone you know, you can appropriate resources at:
http://inside.mines.edu/POGO-Title-IX.

Food and Housing Security:

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify your professor if you are comfortable in doing so. This will enable your professor to provide resources that may be available.

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