ORTA DOĞU TEKNİK ÜNİVERSİTESİ

Syllabus
Electrical and Electronics Engineering
Discrete-Time Systems - 5670402
Fall, 2022

Instructor

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Teaching Assistant

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Course Details

This semester, the EE402 course organization will rely on classical (in-class) education principles. However, lecture-notes of the course and some video-lectures from previous years are publicly available online, thus those who miss classes from any reason will have enough material to follow the course. Note that physical attendance will **not** be mandatory (attendance has never been compulsory in classes that I offer alone anyway), however I highly recommend regularly following in-class lectures.

Note that, attendance to physical on-site midterms and final exam will be obviously mandatory unless you have official medical reasoning.

Prerequisite: EE302 - Feedback Systems (or equivalent).

Lecture Hours:, Tuesday 11:40-12:30, Wednesday 10:40-12:30 @EEMB A-209

Lecture Notes: I have created original lecture notes for the EE402 course in the last three years. I publicly post the lecture notes of my classes on the following GitHub page. We have a textbook (see below) for the course, but we will mainly follow my lecture notes in EE402. I regularly update the lecture notes. Thus, always follow the changes in the GitHub repository.

GitHub Repository Link: https://github.com/mertankarali/Lecture-Notes/

Textbook: Ogata, Katsuhiko. Discrete-time control systems. Vol. 2., Prentice Hall, 1995.

Video Lectures: In previous semesters, I had created and shared some video lectures (content based on lecture notes) and publicly posted them to YouTube under a dedicated YouTube playlist. You can reach the URL of the YouTube playlist from the course website.

EE402 Course Website: https://blog.metu.edu.tr/mertan/courses/ee402/

Description & Outline

EE402 is an undergraduate-level course in the area of control theory. The main goal is to teach the fundamentals of the design and analysis of discrete-time control systems. Throughout the semester, we will cover topics such as the z-plane analysis of discrete-time systems, analysis and design of discrete systems using conventional methods (such as root-locus, frequency response functions, and bode diagrams), state-space analysis of discrete-time control systems, state feedback controller, and observer design for discrete-time systems.

Course Grading

- **3 Midterm Examinations ($M_1, M_2, \& M_3$):** There will be 3 on-campus midterm examinations.
  - Each midterm exam will be **limited-open** or **general-open** material exams and I will decide on the format on each exam a copule weeks prior to that exam.
  - In a **limited-open** material exam you can use any text-based material (notes, book, worksheets, etc.) and any computing device provided it does not have internet and/or wireless communication capabilities (e.g., calculators).
  - In a **general-open** material exam you can use text-based materials (notes, book, formula sheets, etc.), calculators and other computing devices (provided that the device does not have cellular connection and all the cameras of the devies are covered thorughout the exam), web sources, software packages (MATLAB, Octave etc.) etc. Note that communicating with any other person via any means is strictly forbidden.
  - When computing your total midterm grade of the course, we will drop the midterm with the minimum grade and take the average of the remaining **2** midterms. In this context, the overall total midterm grade of the course will be computed based on the following formula

$$\mathbf{M} = \frac{\left(\sum_{j=1}^{3} M_j\right) - \min\{M_1, M_2, M_3\}}{2}$$

- **Final Examination (F):** Final exam will cover (almost) all the topics taught in the class. Final exam will certainly be a limited open material exam.

- **Mini Projects ($p_1, ..., p_K$):** There will be $K \approx 6$ mini projects.
  - Majority of the projects will also consist of some computational parts that you will solve using MATLAB in addition to the classical theoretical parts.
  - You will submit a full report of your project before the due date, including your theoretical solutions as well as a report (pdf) of your MATLAB solutions (if applicable).
  - When computing your total mini project grade of the course, we will drop the project with the minimum grade and take the average of the remaining $K - 1$ projects. In this context, overall total project grade of the course will be computed based on the following formula

$$\mathbf{P} = \frac{\left(\sum_{j=1}^{K} p_j\right) - \min\{p_1, \cdots, p_K\}}{K - 1}$$

- **Total Course Grade (G)** is calculated based on the formula given below

$$G = 0.45\,\mathbf{M} + 0.40\,\mathbf{F} + 0.15\,\mathbf{P}$$

Letter Grades

The final letter grades of the course will be based on the following table.

$G < 45$	FF
$45 \leq G < 55$	FD
$55 \leq G < 65$	DD
$65 \leq G < 70$	DC
$70 \leq G < 75$	CC
$75 \leq G < 80$	CB
$80 \leq G < 85$	BB
$85 \leq G < 90$	BA
$90 \leq G < 95$	AA
$95 \leq G$	AA+

Of course, there is no AA+ grade in METU. If you manage to get AA+ from this course, you earn the opportunity to ask me to write recommendation letters for graduate school applications. If your letter grade is not AA+, please don't ask me to write a letter of recommendation for you.

Ethics

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of mini projects, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded projects and exams, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.
In addition, the specific ethics guidelines for this course are:

(1) Mini projects are not assignments, and thus working together on mini projects is NOT ALLOWED. The final output should reflect your OWN individual effort.
(2) If you are stuck at a problem (or problems) in mini projects, you can ask for some help from your friends. However, it must be at the conceptual level, and your collaborator(s) must be acknowledged on your project submission. In other words, you can not share anything other than ideas, such as write-ups, sample codes (for computational problems). DO NOT COPY. Your solutions should come from your brain, not your friend's papers/solutions.
(3) While working on your final write-ups for mini-projects, you may **refer** to your class notes, textbooks, online-related sources, etc.
(4) Disclosure of Outside Sources: If you use outside sources other than your class notes and your textbooks to solve problems (i.e., if you have used sources such as online sources), then you must disclose the outside source and what you took from the source in your write-up. THIS IS GENERALLY OK – just disclose your sources.

Report any violations you witness to the instructor.