

**Syllabus**  
**Electrical and Electronics Engineering - 5670402**  
**Discrete Time Systems**  
**Fall, 2018**

**Instructor**

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**Teaching Assistants**

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**Course Details**

Website: <https://blog.metu.edu.tr/mertan/courses/ee402/>  
Schedule: Monday, 11:40-12:30, Wednesday, 13:40-15:30, @EA312  
Textbook: Ogata, Katsuhiko. Discrete-time control systems. Vol. 2., Prentice Hall, 1995.  
Prerequisite: EE302 - Feedback Systems (or equivalent).

**Description & Outline**

EE402 is an undergraduate level course in the area of control theory. The main goal is to teach the basics of 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.

If time permits, I would like to cover some “advanced” topics such as *system identification*, *Kalman filter*, *Linear Time Periodic Systems*.

**Course Grading**

- **2 Midterm Examinations ( $M_1$  and  $M_2$ ):** There will be two (open book and notes) midterm examinations.
- **Final Examination ( $F$ ):** Final exam may (or may not) cover all the topics taught in the class, and will be again open book and notes.
- **Total Exam Grade ( $E$ )** is calculated based on the formula given below

$$E = \text{MAX} (\text{MEAN} (M_1, M_2, F), \text{MEDIAN} (M_1, M_2, F)) \text{sign}(F)$$

Your final **Total Exam Grade ( $E$ )** is determined by the maximum of **Mean of Three Exam Scores** and **Median of Three Exam Scores**. However, you have to attend the Final exam and get at least **1** in order to pass from this course.

- **Mini Projects** ( $p_1, \dots, p_N$ ): There will be  $N$  many mini projects.
- **Total Project Grade** ( $P$ ) is calculated based on the formula given below

$$P = \text{MAX}(\text{MEAN}(p_1, \dots, p_N), \text{MEDIAN}(p_1, \dots, p_N))$$

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

$$G = \alpha E + (1 - \alpha)P, \text{ where } \alpha \in (0, 1)$$

Possible range of  $\alpha$  is  $0.75 \pm 0.05$

### Notes on Projects

- In this course, you will submit  $N$  many 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 (most probably hand written) as well as a printed report of your MATLAB solutions (if applicable).

### 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 are NOT ALLOWED. The final output should reflect your OWN individual effort.
- (2) If you stuck at a problem (or problems), 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 take home exam. 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 paper.
- (3) While working on your final write-ups for take home exams, you may **refer** to your own class notes, text-books, online related sources, etc.
- (4) Disclosure of Outside Sources: If you use outside sources other than your class notes and your text books to solve problems (i.e. if you have used sources such as your friend, the Internet) then you must disclose the outside source and what you took from the source in your writeup. THIS IS GENERALLY OK – just disclose your sources.

Report any violations you witness to the instructor.