# OSTİM TEKNİK ÜNİVERSİTESİ

## DERS KATALOG FORMU
## (COURSE CATALOGUE FORM)

| Dersin Adı | | | | Course Name | | |
|---|---|---|---|---|---|---|
| Kontrol Sistemleri | | | | Control Systems | | |
| Kodu (Code | Yarıyılı (Semeste | Kredisi (Local | AKTS Kredisi (ECTS | Ders Uygulaması, Saat/Hafta (Course Implementation, Hours/Week) | | |
| | | | | Ders (Theoretical) | Uygulama (Tutorial) | Laboratuar (Laboratory) |
| EEE 310 | 6 | 4 | 5 | 4 | 0 | 0 |

| | | | |
|---|---|---|---|
| Bölüm / Program (Department/Program) | Elektrik-Elektronik Mühendisliği Electrical and Electronics Engineering | | |
| Dersin Türü (Course Type) | Core | Dersin Dili (Course Language) | İngilizce (English) |
| Dersin Önkoşulları (Course Prerequisites) | Yok (none) | | |

| Dersin mesleki bileşene katkısı, % (Course Category | Temel Bilim (Basic Sciences) | Temel Mühendislik (Engineering Science) | Mühendislik Tasarım (Engineering Design) | İnsan ve Toplum Bilim (General Education) |
|---|---|---|---|---|
| | 10 | 20 | 70 | 0 |

| | |
|---|---|
| Dersin İçeriği (Course Description) | Mathematıcal modelin and basic system descriptions, Concepts of feedback and stability, Introduction to linear control theory, Feedback system response analysis, Controller design using classical methods. |
| Dersin Amacı (Course Objectives) | Mathematical modeling of input-output relationship of systems, • Analyzing system response in frequency domain using classical control theory tools, • Dynamic controller design using classical kontrol theory methods. |
| Dersin Öğrenme Çıktıları (Course Learning Outcomes) | Students who pass this course will:<br>1) Obtain transfer function of a linear time invariant systems by using Laplace transform 2) Obtain transfer function by using block diagram reduction method and signal flow graph 3) Perform stability analysis of a feedback system by using Routh-Hurwitz and Nyquist Plots 4) Analyze and synthezise of second-order systems 5) Analyze and synthezise of frequency response of the system respesented as transfer functions 6) Analyze and synthezise of feedback system with Root-Locus method 7) Design of feedback controller by using root locus and frequency response methods |

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|---|---|---|---|
| Ders Kitabı (Textbook) | "Modern Control Engineering, 3e" Katsuhiko Ogata, Prentice Hall, 1997<br>Ogata K., Modern Control Engineering, Prentice-Hall of India Pvt Ltd., New Delhi, 3rd edition, 2000. | | |
| Diğer Kaynaklar (Other References) | 3) "Feedback Control Systems" C.L. Philips and R.D. Harbor, Prentice Hall, 2000 4) "Feedback Control of Dynamic Systems" G.F. Franklin, J.D. Powell and A. Emami-Naeni, Prentice Hall, 2002 | | |
| Ödevler ve Projeler (Homework & Projects) | Her öğrenci verilen ödevi kendi çabasıyla hazırlamak ve zamanında teslim etmek zorundadır.<br>Every student is responsible of exhibiting his/her own effort, and submitting assignments on | | |
| Laboratuar Uygulamaları (Laboratory Work) | - | | |
| Bilgisayar Kullanımı (Computer Use) | - | | |
| Diğer Uygulamalar (Other Activities) | - | | |
| Başarı Değerlendirme Sistemi (Assessment Criteria) | Faaliyetler (Activities) | Adedi (Quantity | Değerlendirmedeki Katkısı, % (Effects on Grading, %) |
| | Yıl İçi Sınavları (Midterm Exams) | 1 | 35 |
| | Kısa Sınavlar (Quizzes) | | |
| | Ödevler (Homework) | 5 | 25 |
| | Projeler (Projects) | | |
| | Rapor (Report) | | |
| | Dönem Ödevi/Projesi (Term Paper/Project) | | |
| | Laboratuar Uygulaması (Laboratory Work) | | |
| | Devam Durumu (Attendance) | | |
| | Final Sınavı (Final Exam) | 1 | 40 |

# COURSE PLAN

| Weeks | Topics | Course Outcomes |
|---|---|---|
| 1 | introduction to the lesson | I |
| 2 | Mathematical models, Laplace transforms, transfer functions | II, III |
| 3 | Block diagram models, signal flow graph models | IV, V,VI |
| 4 | Open and closed loop control systems, sensitivity | IV, VI |
| 5 | Steady-state error | IV, VI |
| 6 | Performance of second order system, stability | V, VI |
| 7 | (Midterm) | I, II, II |
| 8 | Root locus concept | I, II, III |
| 9 | System design by root-locus | IV |
| 10 | Bode diagrams | IV |
| 11 | System design by Bode diagrams | II, III, V |
| 12 | System design by Bode diagrams | V, VI |
| 13 | Log-magnitude and phase diagrams, Nyquist criterion, relative stability and Nyquist stability criterion | II, V, VI |
| 14 | Minimum/non-minimum phase systems, static error constants through Bode diagrams, phase/gain margins, system bandwidth | II, III, IV, |

## Dersin Mühendislik Programıyla İlişkisi

| | Programın mezuna kazandıracağı bilgi ve beceriler (programa ait çıktılar) | Katkı Seviyes | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1 | Matematik, Temel Bilim ve Mühendislik bilgilerini Elektrik-Elektronik Mühendisliği alanında uygulama becerisi | | | X |
| 2 | Elektrik-Elektronik Mühendisliği alanında deney tasarlama, yürütme ve sonuçları yorumlama | | X | |
| 3 | Amaca yönelik sistem, sistem bileşenleri ve süreçlerini, ekonomik, çevresel, sosyal, politik, etik, sağlık, | | X | |
| 4 | Çok disiplinli konularda çalışma yetisi | | X | |
| 5 | Elektrik-Elektronik Mühendisliği alanında problemleri tanımlama, modelleme ve çözme becerisi | | X | |
| 6 | Mesleki ve etik sorumlulukların doğru algılanması | X | | |
| 7 | Etkin iletişim kurma becerisi | X | | |
| 8 | Mühendislik uygulamalarının toplumsal, küresel, ekonomik ve çevresel düzeyde etkilerinin doğru algılanması | | X | |
| 9 | Yaşam boyu öğrenme ve alanındaki gelişmeleri izleyebilme becerisi | | X | |
| 10 | Güncel sorunlar konusunda bilinç | X | | |
| 11 | Modern mühendislik araç, yöntem ve yetilerini mühendislik uygulamalarında kullanabilme becerisi | | X | |
| 12 | Kalite bilinci | X | | |
| 13 | Bireysel ve takım içinde çalışma becerisi | X | | |

**1: Az Katkı, 2. Kısmi Katkı, 3. Tam Katkı**

**Relationship between the Course and the Engineering Curriculum**

| | Program Outcomes | Level of Contribution | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1 | An ability to apply knowledge of mathematics, science, and engineering to Electrical and Electronics Engineering problems | | | X |
| 2 | An ability to design and conduct experiments, and to analyze and interpret gathered data | | X | |
| 3 | an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability | | X | |
| 4 | An ability to function on multi-disciplinary teams | | X | |
| 5 | An ability to identify, formulate, and solve Electrical and Electronics Engineering problems | | X | |
| 6 | An understanding of professional and ethical responsibility | X | | |
| 7 | An ability for effective communication | X | | |
| 8 | An ability to understand and correctly interpret the impact of engineering solutions in a social/global context | | X | |
| 9 | An ability to engage in life-long learning to follow developments in Electrical and Electronics Engineering | | X | |
| 10 | A knowledge and understanding of contemporary issues | X | | |
| 11 | An ability to skillfully use modern engineering tools and techniques necessary for engineering design, analysis and applications | | X | |
| 12 | A recognition of the need for quality | X | | |
| 13 | An ability to function individually as well as part of a team | X | | |

| *Düzenleyen (Prepared by)* | *Tarih (Date)* | *İmza (Signature)* |
|---|---|---|
| *Mehmet Yuceer* | 13.09.2021 | |