

COURSE RECORD

Code	CP100.IE
Name	Career Planning
Hour per week	1 (1 + 0)
Credit	1
ECTS	1
Level/Year	Undergraduate / 1
Semester	Spring
Type	Compulsory
Prerequisites	-
Description	This course aims to make it possible for students to be employed in suitable fields based on their education and skills while creating the creation of career awareness in the early period of higher education. Furthermore, it aims to raise awareness about the expectations and dynamics of business life and to enable help students to develop personal and professional skills. Career Planning provides information about different sectors, to develop students' skills, as well as to get to know the tools they can use.
Objectives	Aiming to raise students' awareness about the importance of career planning in the preparation process for the professional world. Understanding the expectations of the professional world correctly Helping them to develop their knowledge and skills in line with the requirements of the relevant sectors.
Learning Outcomes	At the end of the term, students, LO1. Learn career center activities. LO2. Recognize options for career development. LO3. Recognize the data required for effective communication skills. LO4. Analyze the importance of professional relationship networks. LO5. Recognize the support units at the university. LO6. Learn the effective use of necessary resources for their career
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	0	0	0	0	0	0	0	3	2	1	2	1
LO2	0	0	0	0	0	5	3	5	1	3	1	2
LO3	0	0	0	0	0	0	0	4	2	2	1	3
LO4	0	0	0	0	0	4	2	2	1	5	1	3
LO5	0	0	0	0	0	0	2	4	1	1	5	3
LO6	0	0	0	0	0	0	0	1	1	4	2	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
What is the Career?	L01, L02
What are the concepts of intelligence, personality, knowledge, skill, talent, and competence?	L02, L03
Basic Communication Skills, Diction and Body Language	L02
Soft-Skills	L02
National and International Exchange Programs	L04, L06
Effective Interview Techniques	L01, L04, L06
Resume and Cover Letter Preparation	L01, L04, L06

DERS BİLGİLERİ

Kodu	CP100.IE
İsmi	Kariyer Planlama
Haftalık Saati	1 (1 + 0)
Kredi	1
AKTS	1
Seviye/Yıl	Lisans / 1
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	-
İçerik	Kariyer bilincinin yükseköğretim erken döneminde oluşturulması ile öğrencilerin eğitimlerine ve yeteneklerine uygun alanlarda istihdam edilmelerini mümkün kılmayı hedeflemektedir. Dersin amacı sizlerde iş hayatının beklentileri ve dinamikleri konusunda farkındalık oluşturmak ve kişisel ve profesyonel gelişiminize ilişkin beceriler geliştirmesini sağlamaktır. Kariyer Planlama Dersi, sizlerin farklı sektörler hakkında bilgi sahibi olmanızı, kendinizin ve becerilerinizin gelişimi yanında kullanabileceğiniz araçları tanımanızı amaçlar.

COURSE RECORD

Code	IE 102
Name	Exploring Profession
Hour per week	5 (3+2)
Credit	4
ECTS	4
Level/Year	Undergraduate / 1
Semester	Spring
Type	Compulsory
Prerequisites	-
Description	IE102 is designed to promote the development of professional passion among students and provide early-on/hands-on experience through lectures, field trips, case studies, and projects. Students will have a big picture view of the engineering profession and its practical requirements. Students will learn about the various aspects of the engineering profession and acquire both technical skills and nontechnical skills, in areas such as communication, teamwork, and engineering ethics. The course also supports students entering the complex social system of the university in their efforts to succeed in engineering through personal and professional development, including understanding themselves as integrated physiological, social, and psychological entities who are able to formulate strategies and employ available university resources to support their academic and personal development. This course also provides a compressive knowledge about the philosophy of the ethics, different types of ethics (normative theories of ethics, anthropocentrism, relativism, monism, post modernism, etc.) and code of ethics.
Objectives	Introducing students to a big picture view of the engineering profession Developing skills in communication, teamwork, ethics, and entrepreneurship Introducing basic principles of ethics, and ethical problems in engineering, and ethical consequences of different engineering solutions
Learning Outcomes	By the end of the course, the student will be able to LO1: Identify the issues related to engineering ethics and professional conduct. LO2: Appraise the relation of industrial engineering with other disciplines as well as with the production and service systems. LO3: Define and explain common industrial engineering terminology. LO4: Summarize the steps of scientific problem solving. LO5: Apply systems concept and industrial engineering approach to the design and analysis of systems.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	0	0	0	0	0	0	3	5	0	0	0
L02	0	0	0	0	0	2	2	3	0	0	0	0
L03	3	2	0	0	0	0	0	0	0	0	0	0
L04	3	2	0	0	0	0	0	0	0	0	0	0
L05	3	2	0	0	0	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Processes	L01
Charts and Diagrams	L02

Travelling Salesperson Problem, Algorithms	L02, L03, L05
Make-to-order, make-to-stock, Just-in-Time	L04
Performance measures, efficiency, effectiveness, Simulation, Decision making	L02, L03, L05
Philosophy and historical developments in ethics	L01
Systems thinking, critical thinking; different types of ethics	L01
Code of ethics	L01
Exterior acts and interior intentions	L01
Truth: person-to-person, person-to-society	L01
Fairness: person-to-person, person-to-society	L01
Moral responsibility	L01
Engineering ethics	L01

DERS BİLGİLERİ

Kodu	IE 102
İsmi	Mesleki Oryantasyon
Haftalık Saati	5 (3+2)
Kredi	4
AKTS	4
Seviye/Yıl	Lisans /1
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	-
İçerik	Mühendislik öğrencilerinin mesleki tutkusunun gelişimini teşvik etmek için dersler, saha gezileri, vaka analizi ve projeler yoluyla deneyim kazandırmak üzere tasarlanmıştır. Öğrenciler, mühendislik mesleğinin ve pratik gereksinimlerinin büyük bir resmini görecekler, mühendislik mesleğinin çeşitli yönlerini öğrenecek ve iletişim, takım çalışması ve mühendislik etiği gibi alanlarda teknik ve sosyal beceriler kazanacaklardır. Ders aynı zamanda üniversitenin karmaşık sosyal sistemine giren öğrencileri destekleyerek sosyal ve psikolojik bireyler olarak öğrencilerin kendilerini anlamalarına yardımcı olacak, kendi stratejilerini formüle edebilen, akademik ve kişisel gelişimlerini desteklemek için mevcut üniversite kaynaklarını kullanabilen öğrenciler yetiştirilmesine yardımcı olacaktır. Bu ders aynı zamanda etik felsefesi, farklı etik türleri (normatif etik teorileri, insan merkezilik, rölativizm, monizm, post modernizm vb.) ve etik kuralları hakkında bilgi sağlar.

COURSE RECORD

Code	IE 197
Name	Summer Training I
Hour per week	2 (0+2)
Credit	1
ECTS	2
Level/Year	Undergraduate / 4
Semester	Fall
Type	Compulsory
Prerequisites	A student who wants enroll for the course must have studied at least one semester in the Industrial Engineering (IE) undergraduate program, besides workplace of the internship must be approved by the IE department.
Description	This is the first of three courses designed for internship programs that industrial engineering students are to attend during their education. The students who have attended a summer internship program for the first time register for the course. During the internship program, the students will have first-hand experience to learn the business environment, relationships in the business environment, the business culture, and business processes. The students are assessed considering internship report, presentations, and the internship program coordinator's evaluation during the semester. The students get their ECTS credits for the course in the fourth year. To enroll in the course and get ECTS credits, a student must complete at least 6-week (30-workday) program. For detailed procedures, refer to the IE department's web page.
Objectives	Learning the business environment, relationships in the business environment, the business culture, and business processes. Applying theoretical knowledge acquired from lectures to real-life problems. Being ready for business life after graduation. Increasing job opportunities in IE related business sectors.
Learning Outcomes	By the end of the course, the student will be able to LO1: Apply theoretical knowledge acquired from lectures to real-life problems. LO2: Demonstrate an improvement in personal and professional skills. LO3: Observe and report real-life systems from and IE point of view. LO4: Detect a problem or a possible improvement in real-life processes. LO5: Design a project to solve a real-world problem and share the results of a real-world problem related project (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	4	4	2	2	2	5	4	3	1	2	0	0
L02	0	0	0	0	0	5	4	3	3	4	4	0
L03	2	4	3	3	4	3	4	3	1	2	0	3
L04	2	2	3	4	3	3	0	3	1	2	0	3
L05	2	2	2	4	3	3	0	3	1	2	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Training, Internship Project/Research	L01, L02, L03
Workplace experience	L04, L05

DERS BİLGİLERİ

Kodu	IE 197
İsmi	Yaz Stajı I
Haftalık Saati	2 (0+2)
Kredi	1
AKTS	2
Seviye/Yıl	Lisans/4
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	Derse kayıt yaptırmak isteyen öğrencinin Endüstri Mühendisliği lisans programında en az bir yarıyıl okumuş olması ve staj yapacağı işyerinin bölüm tarafından onaylanmış olması gerekir.
İçerik	Endüstri mühendisliği öğrencilerinin eğitimleri boyunca alacakları staj programları için tasarlanmış üç dersten ilkidir. İlk kez yaz stajı programına katılan öğrenciler derse kayıt olurlar. Staj programı süresince öğrenciler iş ortamını, iş ortamındaki ilişkileri, iş kültürünü ve iş süreçlerini ilk elden öğrenme deneyimine sahip olacaklardır. Öğrenciler, staj raporları, sunumlar ve staj programı koordinatörünün dönem içindeki değerlendirmesi dikkate alınarak değerlendirilir. Öğrenciler ders için AKTS kredilerini dördüncü yılda alırlar. Derse kayıt olabilmek ve AKTS kredisi alabilmek için öğrencinin en az 6 haftalık (30 iş günü) bir programı tamamlaması gerekir. Ayrıntılı prosedürler için Endüstri Mühendisliği bölümünün web sayfasını ziyaret ediniz.

COURSE RECORD

Code	IE 211
Name	Mathematical Modelling
Hour per week	5 (3+2)
Credit	4
ECTS	7
Level/Year	Undergraduate / 2
Semester	Fall
Type	Compulsory
Prerequisites	Math 151
Description	Being able to solve the real-life problems and obtaining the right solution requires understanding and modeling the problem correctly and applying appropriate optimization tools and skills to solve the mathematical model. This course will focus on how to formulate, analyze, and solve mathematical models that represent real-world problems. In this course, how to use optimization software for solving optimization problems will be discussed. In particular, this course will cover linear programming, nonlinear programming, problem definition and formulation, sensitivity analysis, network optimization, integer linear programming, big-M method, and integrality property.
Objectives	Abstracting a real-world system/problem conceptually Developing mathematical models that are appropriate for the system/problem. Solving a mathematical model by using available off-the-shelf software (e.g., GAMS, CPLEX, EXCEL SOLVER, EXPRESS, GUROBI) Interpreting the solutions obtained from the models in terms of the real-world system.
Learning Outcomes	By the end of the course, the student will be able to LO1: Formulate decision problems as linear, integer, nonlinear, network flow, and multi-objective models with optimization software. LO2: Differentiate between convex and non-convex optimization problems and the general search technique in solving optimization problems. LO3: Solve linear programming problems by means of the graphical approach, primal and dual simplex methods. LO4: Interpret sensitivity analysis results for linear programming. LO5: Code an optimization model and/or algorithms using Excel, GAMS optimization software, Java or other modeling languages and interpret the solution. LO6: Design a team project to solve a real-world problem and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	5	3	3	2	3	0	0	0	0	0	0	0
LO2	3	3	1	1	1	0	0	0	0	0	0	0
LO3	3	3	3	2	1	0	0	0	0	0	0	0
LO4	3	3	1	2	3	0	0	0	0	0	0	0
LO5	3	3	3	4	3	2	0	0	0	0	0	0
LO6	5	3	3	4	3	2	4	0	2	0	2	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Modelling	L01
Mathematical Modeling in General	L01
Linear Programming Models	L01, L02
Integer Programming Models	L03, L05, L06
Duality and Sensitivity Analysis	L04
Non-Linear Programming Models	L01, L02
Multi-Objective Programming Models	L01, L02
Simulation Models	L05

DERS BİLGİLERİ

Kodu	IE 211
İsmi	Matematiksel Modelleme
Haftalık Saati	5(3+2)
Kredi	4
AKTS	7
Seviye/Yıl	Lisans /2
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	Math 151
İçerik	Gerçek hayat problemini çözebilmede ve doğru çözümü elde etmek problemin doğru şekilde anlaşılmasını ve modellemesini ve uygun optimizasyon araçlarının ve matematiksel model çözüme yeteneklerinin kullanılmasını gerektirir. Bu ders gerçek hayat problemlerini yansıtan matematiksel modellerin nasıl formüle edileceğine, analiz edileceğine ve çözüleceğine odaklanır. Bu derste optimizasyon yazılımlarının, optimizasyon problemlerinin çözümünde nasıl kullanılacağı da tartışılacaktır. Özellikle, bu ders doğrusal programlama, doğrusal olmayan programlama, problem tanımlama ve formülasyonu, duyarlılık analizi, ağ optimizasyonu, tamsayılı doğrusal programlama, büyük M metodu ve integrallik özelliği konularını içerir.

COURSE RECORD

Code	IE 212
Name	Deterministic Optimization
Hour per week	4 (4+0)
Credit	4
ECTS	7
Level/Year	Undergraduate/2
Semester	Spring
Type	Compulsory
Prerequisites	IE 211, MATH 203
Description	This course is a continuation of the course IE211 Mathematical Modeling in which the process of mathematical modeling, the development of models, and the coding and solution of the models by off-the-shelf software are emphasized. In this course, the solution techniques and algorithms for different types of problems, e.g., simplex, dual simplex, network simplex, branch-and-bound algorithms and decomposition techniques, are introduced. Modeling and solving real-world problems are also emphasized in this course. Homework and project assignments will enhance students' modeling and problem-solving abilities in practice.
Objectives	Recognizing the concept of duality and its importance in proving the optimality of a solution. Equipping the students with the capability of developing and coding algorithms to solve different types of models including linear, network, integer, and non-linear programming models. Modelling and solve real-world problems in homework and project assignments
Learning Outcomes	By the end of the course, the student will be able to LO1: Formulate decision problems as linear, integer, nonlinear, network flow, and multi-objective models with optimization software. LO2: Differentiate between convex and non-convex optimization problems and the general search technique in solving optimization problems. LO3: Solve linear programming problems by means of the graphical approach, primal and dual simplex methods. LO4: Solve integer linear programming problems by means of branch and bound and branch and cut methods. LO5: Indicate network flow models and solution algorithms for these models. LO6: Design a team project to solve a real-world problem and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	5	3	0	2	3	0	0	0	0	0	0	0
LO2	3	3	0	1	1	0	0	0	0	0	0	0
LO3	3	3	0	2	1	0	0	0	0	0	0	0
LO4	3	3	0	2	3	0	0	0	0	0	0	0
LO5	3	3	0	4	3	2	0	0	0	0	0	0
LO6	5	3	0	4	3	2	4	0	2	0	2	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Solving Linear Programming Models	L01
Simplex Algorithm	L03
Dual Simplex Algorithm	L03
Solving Network Flow Models	L05
Transportation Problem, Network Simplex Algorithms	L05
Ford- Fulkerson Method, Dijkstra's Algorithm, Floyd-Warshall Method	L05
Introduction to Solving Integer Programming Models	L04
Branch-and-Bound Method & Branch-and-Cut Algorithm, Decomposition Methods	L04
Solving Non-Linear Programming Models	L02, L06
Decision Analysis Models	L02, L06

DERS BİLGİLERİ

Kodu	IE 212
İsmi	Deterministik Optimizasyon
Haftalık Saati	4(4+0)
Kredi	4
AKTS	7
Seviye/Yıl	Lisans/2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 211, MATH 203
İçerik	Bu ders içerisinde matematiksel modelleme süreci, model gelişimi, kodlaması ve modellerin yazılımlar ile çözüm tekniklerinin vurgulandığı IE 211 Matematiksel Modelleme dersinin devamı niteliğindedir. Bu derste, farklı türdeki problemlerin (Örn. simpleks, dual simpleks, network simpleks, branch and bound algoritmaları ve dekompozisyon teknikleri) çözüm teknikleri ve algoritmaları öğretilmektedir. Modelleme ve gerçek hayat problemleri de derste vurgulanmaktadır. Ödev ve projeler öğrencilerin modelleme ve problem çözme yeteneklerini uygulama yaptırarak geliştirecektir.

COURSE RECORD

Code	IE 221
Name	Probability
Hour per week	4 (4+0)
Credit	4
ECTS	5
Level/Year	Undergraduate/2
Semester	Fall
Type	Compulsory
Prerequisites	MATH 151
Description	IE 221 is an introductory course to the concept of probability. Axioms of probability, fundamentals of probability, sample space, conditional probability, the most used discrete and continuous probability distributions, moment generating functions, and central limit theorem, joint probability distributions subjects will be delivered to the class.
Objectives	Introducing the fundamentals of probability theory. Equipping students with tools to analyze random events. Providing necessary background for decision-making under uncertainty. Providing necessary background for statistical analysis.
Learning Outcomes	By the end of the course, the student will be able to LO1: Define sample spaces and assign probabilities to events using probability axioms. LO2: Determine the independence of events, calculate the conditional probabilities of events. LO3: Recognize the appropriate discrete and continuous distribution in a specific application and use it for analysis. LO4: Use cumulative distribution/probability density functions to calculate probabilities, means, and variances. LO5: Use joint probability mass and joint probability density functions to calculate conditional and marginal probability laws, and covariance. LO6: Simulate the law of large numbers and the central limit theorem using a programming language.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	5	0	0	2	0	2	0	0	0	0	0	0
L02	5	0	0	2	0	2	0	0	0	0	0	0
L03	3	0	0	0	0	2	0	0	0	0	0	0
L04	3	0	0	0	0	2	0	0	0	0	0	0
L05	3	0	0	0	0	2	0	0	0	0	0	0
L06	3	0	0	0	0	2	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction, counting, axioms of probability	L01
Conditional probability, Bayes' theorem, random variables, discrete random variables	L01, L02
Expectation, variance, moment generating function, geometric distribution	L01, L02
Binomial and negative binomial distributions	L03, L04
Hypergeometric and Poisson distributions	L03, L04
Continuous probability distributions, expectation, variance	L03, L04

Uniform, Exponential, and Gamma distributions	L03, L04
Normal distribution, Normal approximation of binomial	L03, L04
Weibull, Beta and Chi-Square distributions	L03, L04
Joint probability distributions, conditioning, independence	L05-L06
Derived distributions, correlation, covariance	L05
Convergence, the weak and strong laws of large numbers, CLT	L06

DERS BİLGİLERİ

Kodu	IE 221
İsmi	Olasılık
Haftalık Saati	4 (4+0)
Kredi	4
AKTS	5
Seviye/Yıl	Lisans/2
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MATH 151
İçerik	Olasılık kavramına giriş niteliğinde bir derstir. Olasılık aksiyomları, olasılığın temelleri, örnek uzay, koşullu olasılık, en sık kullanılan ayırık ve sürekli olasılık dağılımları, moment üreten fonksiyonlar ve merkezi limit teoremi, ortak olasılık dağılımları konuları derste işlenecektir.

COURSE RECORD

Code	IE 222
Name	Statistics
Hour per week	4 (2+2)
Credit	4
ECTS	6
Level/Year	Undergraduate/2
Semester	Spring
Type	Compulsory
Prerequisites	IE 221
Description	This course introduces summarizing data and using data to make numerical conjectures to students. The focus is on broad treatment of applications of statistics, concentrating on techniques used in industry and science. Topics include descriptive statistics, parameter estimation, confidence intervals, hypothesis testing, analysis of variance, and linear regression. The course includes computer implementations using available up-to-date statistical software.
Objectives	Introducing the role of statistics in research and engineering practice. Developing skills in data gathering and analysis. Providing tools to interpret experimental results. Providing sufficient background to support further studies in industrial engineering.
Learning Outcomes	By the end of the course, the student will be able to LO1: Demonstrate understanding of descriptive statistics by summarizing data numerically and graphically. LO2: Compute point estimates and confidence intervals for unknown parameters of distributions. LO3: Perform hypotheses testing with one or two samples. LO4: Construct and interpret linear regression models. LO5: Be able to use a statistical software (e.g., R, Python, SPSS) LO6: Be able to work in a team and share the results of a statistical analysis (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	5	0	0	0	0	0	0	0	0	0	0	0
L02	5	0	0	0	0	0	0	0	0	0	0	0
L03	5	0	0	0	0	0	0	0	0	0	0	0
L04	5	0	0	0	0	0	0	0	0	0	0	0
L05	0	0	0	3	0	0	0	0	0	0	0	0
L06	3	0	0	3	0	2	3	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Descriptive Statistics	L01, L06
Point Estimation	L02
Interval Estimation	L03
Hypothesis Testing	L03
Linear Regression	L04, L05, L06

DERS BİLGİLERİ

Kodu	IE 222
İsmi	İstatistik
Haftalık Saati	4(2+2)
Kredi	4
AKTS	6
Seviye/Yıl	Lisans/2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 221
İçerik	Bu ders öğrencilere verileri özetlemeyi ve verileri sayısal tahminler yapmak için kullanmayı öğretir. Odak noktası, endüstri ve bilimde kullanılan tekniklere odaklanarak, istatistiklerin uygulamalarının geniş bir şekilde ele alınmasıdır. Konular, tanımlayıcı istatistikler, parametre tahmini, güven aralıkları, hipotez testi, varyans analizi ve doğrusal regresyon şeklindedir. Ders, mevcut güncel istatistiksel yazılımları kullanan bilgisayar uygulamalarını içerir.

COURSE RECORD

Code	IE 242
Name	Business Process Analysis and Design
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/2
Semester	Spring
Type	Compulsory
Prerequisites	-
Description	Business process management, design, analysis such as incremental improvement, process automation, and process redesign are the key concepts and approaches for all systems. This course introduces fundamental concepts that can be used to systematically analyze any business process. The course covers how to identify, document, model, assess, and improve core business processes, process design principles by using sophisticated analytical techniques to design and manage efficient and effective operations and processes.
Objectives	Introducing key concepts and approaches to business process management, design, analysis such as incremental improvement, process automation, and process redesign. Describing and interpret the basic concepts of Lean Manufacturing Techniques Applying appropriate analytical methods to solve possible problems of Business Processing and enabling tools from simple process-mapping to computer-based process-modeling using Signavio and Microsoft Office Visio.
Learning Outcomes	By the end of the course, the student will be able to LO1: Apply time and motion study in different processes. LO2: Analyze the current situation and also compare different processes and select the more efficient process for the system. LO3: Apply lean manufacturing techniques such as 5S, Kaizen, Value Stream Mapping etc. LO4: Use a software (Signavio or Microsoft Office Visio) to do above
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	3	0	0	3	3	0	4	0	0	0	0	0
L02	3	0	0	2	3	0	5	0	0	0	3	0
L03	3	0	2	2	1	2	0	0	0	0	0	0
L04	1	0	4	1	1	2	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Business Process Management	L01
Process Identification	L01
Process Modeling	L02
Process Analysis	L02
Process Redesign and Standardization	L03
Flow Analysis and Work Study	L03
Lean Manufacturing and Industry 4.0	L03

Lean Manufacturing Techniques (SMED, FMEA, Kaizen, Kanban)	L04
Lean Manufacturing Techniques (Value Stream mapping)	L03, L04
Lean Manufacturing Techniques (6 Sigma, Total Productive Maintenance)	L03, L04

DERS BİLGİLERİ

Kodu	IE 242
İsmi	İş Süreçleri Analizi ve Tasarımı
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	-
İçerik	İş süreci yönetimi, tasarımı, artımlı iyileştirme, süreç otomasyonu ve süreç tasarlama gibi temel kavramlar ve yaklaşımlar konuları bir süreç için önemli alanlardır. Bu dersin odak noktası, iş süreçlerini anlamak ve tasarlamaktır. Herhangi bir iş sürecini sistematik olarak analiz etmek için kullanılabilen temel kavramlar ele alınacaktır. Bu ders, herhangi bir iş sürecini sistematik olarak analiz etmek için kullanılabilen temel kavramları tanıtmaktadır. Ders, temel iş süreçlerini tanımlamak, belgelemek, modellemek, değerlendirmek ve iyileştirmek, verimli ve etkili operasyonları ve süreçleri tasarlamak ve yönetmek için karmaşık analitik teknikleri kullanarak süreç tasarım prensiplerini nasıl analiz edileceğini kapsar.

COURSE RECORD

Code	IE 297
Name	Summer Training II
Hour per week	2 (0+2)
Credit	1
ECTS	3
Level/Year	Undergraduate / 4
Semester	Spring
Type	Compulsory
Prerequisites	A student who wants enroll for the course must have studied at least three semesters in the Industrial Engineering (IE) undergraduate program, besides workplace of the internship must be approved by the IE department.
Description	This is the second of three courses designed for internship programs that industrial engineering students are to attend during their education. The students who have attended a summer internship program for the second time register for the course. During the internship program, the students will have first-hand experience to learn the business environment, relationships in the business environment, the business culture, and business processes. The students are assessed considering internship report, presentations, and the internship program coordinator's evaluation during the semester. The students get their ECTS credits for the course in the fourth year. To enroll in the course and get ECTS credits, a student must complete at least 8-week (40-workday) program. For detailed procedures, refer to the IE department's web page.
Objectives	Learning the business environment, relationships in the business environment, the business culture, and business processes. Applying theoretical knowledge acquired from lectures to real-life problems. Being ready for business life after graduation. Increasing job opportunities in IE related business sectors.
Learning Outcomes	By the end of the course, the student will be able to LO1: Apply theoretical knowledge acquired from lectures to real-life problems. LO2: Demonstrate an improvement in personal and professional skills. LO3: Observe and report real-life systems from and IE point of view. LO4: Detect a problem or a possible improvement in real-life processes. LO5: Design a project to solve a real-world problem and share the results of a real-world problem related project (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	2	2	2	2	2	5	4	3	1	2	0	0
L02	0	0	0	0	0	5	5	3	3	5	4	3
L03	5	5	5	5	5	5	4	4	1	2	0	0
L04	2	2	5	5	5	5	4	4	1	2	0	0
L05	2	2	2	5	5	5	4	4	1	2	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Training, Internship Project/Research	L01, L02, L03
Workplace experience	L04, L05

DERS BİLGİLERİ

Kodu	IE 297
İsmi	Yaz Stajı II
Haftalık Saati	2 (0+2)
Kredi	1
AKTS	3
Seviye/Yıl	Lisans /4
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	Derse kayıt yaptırmak isteyen öğrencinin Endüstri Mühendisliği lisans programında en az üç yarıyıl okumuş olması ve staj yapacağı işyerinin bölüm tarafından onaylanmış olması gerekir.
İçerik	Endüstri mühendisliği öğrencilerinin eğitimleri boyunca alacakları staj programları için tasarlanmış üç dersten ikincisidir. İkinci kez yaz stajı programına katılan öğrenciler derse kayıt olurlar. Staj programı süresince öğrenciler iş ortamını, iş ortamındaki ilişkileri, iş kültürünü ve iş süreçlerini ilk elden öğrenme deneyimine sahip olacaklardır. Öğrenciler, staj raporları, sunumlar ve staj programı koordinatörünün dönem içindeki değerlendirmesi dikkate alınarak değerlendirilir. Öğrenciler ders için AKTS kredilerini dördüncü yılda alırlar. Derse kayıt olabilmek ve AKTS kredisi alabilmek için öğrencinin en az 8 haftalık (40 iş günü) bir programı tamamlaması gerekir. Ayrıntılı prosedürler için Endüstri Mühendisliği bölümünün web sayfasını ziyaret ediniz.

COURSE RECORD

Code	IE 325
Name	System Simulation
Hour per week	5 (3 + 2)
Credit	4
ECTS	7
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	IE 222
Description	Introductory course in computer simulation, which covers the use of simulation as a decision-making, comparison or estimation tool. The emphasis is on basic concepts and methods in developing discrete-event simulation models for stochastic and dynamic systems and on how to analyze and interpret the results of simulation experiments.
Objectives	Introducing concepts of discrete-event simulation Fostering understanding through real-world simulation applications Equipping students with essential computer simulation tools Using simulation as a decision-making, comparison or estimation tool
Learning Outcomes	By the end of the course, the student will be able to L01: Develop, validate, and verify simulation models. L02: Analyze data and develop input models. L03: Interpret the results of simulation runs. L04: Compare alternative systems using simulation. L05: Use simulation as an optimization tool. L06: Use Simio software proficiently
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
L01	3	0	3	0	5	0	0	0	0	5	0	0
L02	0	3	3	0	5	0	0	0	0	0	0	0
L03	0	0	0	0	5	0	0	0	0	0	0	0
L04	0	3	0	0	0	0	4	0	0	0	0	0
L05	0	3	0	0	0	0	0	0	0	0	0	0
L06	0	0	0	5	0	2	5	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Simulation	L06
Simulation Examples	L03, L06
Statistical Models in Simulation	L01, L06
Input Modeling	L01, L06
Random Numbers and Random Variate Generation	L02, L06
Verification, Calibration, and Validation of Simulation Models	L02, L06
Simulation Performance	L04, L05, L06

DERS BİLGİLERİ

Kodu	IE325
İsmi	Sistem Benzetimi
Haftalık Saati	5 (3 + 2)
Kredi	4
AKTS	7
Seviye/Yıl	Lisans/3
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 222
İçerik	Benzetimin; karar verme, karşılaştırma ve tahmin aracı olarak kullanımını kapsayan bilgisayar ile sistem benzetimine giriş dersiştir. Stokastik ve dinamik sistemler için ayrık olay benzetim modellerinin geliştirilmesinde kullanılan temel kavramlar ve yöntemler ile modeller oluşturularak sonrasında benzetim deneylerinin sonuçları analiz edilerek yorumlanır.

COURSE RECORD

Code	IE326
Name	Business Analytics
Hour per week	3 (3 + 0)
Credit	3
ECTS	6
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	IE 212, IE 222
Description	INFORMS (The Institute for Operations Research and the Management Sciences) define business analytics as the scientific process of transforming data into insight for making better decisions. This course introduces essential analytic methods in descriptive, predictive, and prescriptive business analytics, and can be thought of as a confluence of statistics, operations research, data mining, and machine learning. This course will emphasize machine learning. Machine learning uses interdisciplinary techniques such as statistics, linear algebra, optimization, and computer science to create automated systems that can sift through large volumes of data at high speed to make predictions or decisions without human intervention. Machine learning as a field is now incredibly pervasive, with applications spanning from business intelligence to homeland security, from analyzing biochemical interactions to structural monitoring of aging bridges, and from emissions to astrophysics, etc. This class will familiarize students with a broad cross-section of models and algorithms for machine learning and prepare students for research or industry application of machine learning techniques. The course includes computer implementations using available up-to-date software and programming languages.
Objectives	Introducing supervised and unsupervised learning problems Introducing reinforcement learning Implementing statistical learning methods Obtaining sufficient background to support further studies in data science
Learning Outcomes	By the end of the course, the student will be able to LO-1: Implement machine learning solutions to regression problems, LO-2: Implement machine learning solutions to classification problems, LO-3: Implement machine learning solutions to clustering problems, LO-4: Compare alternative machine learning models, LO-5: Use machine learning algorithms to real-world problems and report on the accuracy that can be achieved.
Requirements	

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	3	0	0	0	0	0	0	0	2	0	0	0
L02	3	0	0	0	0	0	0	0	0	0	0	0
L03	3	0	0	0	0	0	4	0	0	0	3	0
L04	1	1	0	5	5	2	0	0	0	0	0	0
L05	0	3	0	5	5	2	5	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Linear Regression	L01
Gradient descent algorithm	L01, L02
Logistic Regression	L02
Bayesian Classifiers	L02
Support Vector Machines	L01, L02
Learning theory	L04
Model selection, regularization	L04
Neural networks	L01, L02
Decision Trees	L01, L02, L05
Clustering	L03, L05

DERS BİLGİLERİ

Kodu	IE 326
İsmi	İş Analitiği
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	6
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE212, IE 222
İçerik	INFORMS (Yöneylem Araştırması ve Yönetim Bilimleri Enstitüsü), iş analitiğini, daha iyi kararlar almak için verileri içgörüyeye dönüştürmenin bilimsel süreci olarak tanımlar. Bu ders, tanımlayıcı, tahmine dayalı ve kuralcı iş analitiğinde temel yöntemleri tanıtmak amacıyla ve istatistik, yöneylem araştırması, veri madenciliği ve makine öğreniminin bir birleşimi olarak düşünülebilir. Derste ağırlık, makine öğrenmesi üzerinedir. Makine öğrenmesi, insan müdahalesi olmadan tahminlerde bulunmak veya kararlar almak için büyük hacimli verileri yüksek hızda işleyebilen otomatik sistemler oluşturmak için istatistik, doğrusal cebir, optimizasyon ve bilgisayar bilimi gibi disiplinler arası teknikleri kullanır. İş zekasından yurt güvenliğine, biyokimyasal etkileşimlerin analizinden yaşanan köprülerin yapısal izlenmesine ve emisyonlardan astrofiziğe vb. uzanan uygulamalarla makine öğrenmesi yaygındır. Bu dersin amacı öğrencilere makine öğrenmesi ile ilgili temel model algoritma ve teknikleri tanıtmak ve endüstriyel uygulamalar yaptırmaktır

COURSE RECORD

Code	IE 335
Name	Stochastic Models
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	IE 221
Description	The course is intended for the junior undergraduate students in Industrial Engineering. Topics to be covered include Markov chains in discrete and continuous cases, the Poisson processes and exponential distribution, and queuing theory. The course requires basic knowledge in probability theory and linear algebra. Students are expected to use and understand basic mathematical notations; select and apply an appropriate mathematical model for certain elementary probabilistic problems; and do calculations accurately.
Objectives	Introducing the basic concepts of the theory of stochastic processes. Introducing of the most important types of stochastic processes. Studying various properties and characteristics of processes. Equipping the students to be able to model random events.
Learning Outcomes	By the end of the course, the student will be able to LO1: Model uncertainty using basic stochastic processes. LO2: Set up and analyze Markov chains. LO3: Develop Markovian models for IE applications. LO4: Derive and apply main formulas for some properties (e.g., stationary probabilities, average waiting and system time, expected number of customers in the queue) of queuing systems. LO5: Develop appropriate Markov decision processes to solve problems under uncertainty and risk.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	5	0	0	1	0	1	0	0	0	0	0	0
LO2	5	0	0	2	0	2	0	0	0	0	0	0
LO3	3	0	0	2	0	2	0	0	0	0	0	0
LO4	5	0	0	2	0	2	0	0	0	0	0	0
LO5	5	0	0	2	0	2	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Review of Probability	LO1
Poisson processes and exponential distribution	LO1
Discrete-Time Markov Chain	LO2, L03
Continuous-Time Markov Chain	LO2, L03
Queuing Theory	LO4, L05
Discrete -Time Markov Decision Processes	LO4, L05

DERS BİLGİLERİ

Kodu	IE 335
İsmi	Stokastik Modeller
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 221
İçerik	Ders, Endüstri Mühendisliği lisans öğrencilerine yöneliktir. İşlenecek konular, kesikli ve sürekli durumlarda Markov zincirlerini, Poisson süreçlerini ve üstel dağılımı ve kuyruk teorisini içerir. Ders, temel olasılık teorisi ve lineer cebir bilgileri gerektirir. Öğrencilerden temel matematiksel gösterimleri kullanmaları ve anlamaları, belirli temel stokastik problemler için uygun bir matematiksel model seçimini ve gerekli hesaplamaları yapmaları beklenir.

COURSE RECORD

Code	IE 345
Name	Financial and Managerial Accounting
Hour per week	3 (3+0)
Credit	3
ECTS	4
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	-
Description	Basic accounting knowledge is very crucial for the engineers which covers the financial reporting process, accounting information system, and the use of accounting data for decision making and control. Students will learn to understand the financial statements of an organization, especially the Income Statement and the Balance Sheet. Moreover, they will learn how to analyze and explain the financial performance of a company and to make managerial decisions using accounting information.
Objectives	Analyzing financial reporting process, accounting information system and the use of accounting data for decision making and control. Examining the financial statements of an organization, especially the Income Statement and the Balance Sheet. Analyzing the financial performance of companies. Making managerial decisions using accounting information are a crucial part of the course.
Learning Outcomes	By the end of the course, the student will be able to LO1: Define the main elements of financial accounting information assets, liabilities, equities, revenue, and expenses. LO2: Prepare journal entries, post these entries to ledger, prepare adjustment and closing entries. LO3: Summarize financial statements. LO4: Analyze financial statements to assess and compare liquidity, solvability, and profitability of firms. LO5: Calculate unit costs using job order costing and process cost systems. LO6: Describe the cost behavior, and carry out cost-value-profit analysis
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	0	0	0	0	0	2	0	0	0	0	0
L02	0	0	0	0	0	0	2	0	0	0	0	0
L03	0	0	0	0	0	0	2	0	0	0	0	0
L04	2	0	0	2	0	2	0	0	0	0	0	0
L05	2	0	0	2	0	2	0	0	0	0	0	0
L06	2	0	0	2	0	2	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Analyzing Transactions	L01
The Adjusting Process & Completing The Accounting Cycle	L02
Accounting for Merchandizing Businesses	L02
Inventories, Receivables	L03
Fixed Assets and Intangible Assets	L03, L04

Current Liabilities and Long-Term Liabilities	L03, L04
Stock Transactions and Dividends & Investments	L05
Financial Statement Analysis	L05, L06
Job Order Costing & Process Cost Systems	L05, L06
Cost Behavior and Cost-Volume-Profit Analysis	L06
Budgeting, Cost Allocation and Activity-Based Costing	L06

DERS BİLGİLERİ

Kodu	IE 345
İsmi	Finansal ve Yönetimsel Muhasebe
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	4
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	-
İçerik	İşletmeler için temel muhasebe bilgi ve becerileri anlayıp incelemek mühendisler için önem arz etmektedir. Ders aşağıdaki konuları kapsamaktadır: Finansal raporlama süreci, muhasebe bilgi sistemi, muhasebe verilerinin kullanımı derste işlenen konulardır. Bir işletmenin finansal tablolarını, özellikle Gelir Tablosunu ve Bilançosunu anlamak ve şirketlerin finansal performansını analiz etmek ve muhasebe bilgilerini kullanarak yönetimsel kararlar vermek, dersin önemli bir parçasıdır.

COURSE RECORD

Code	IE 346
Name	Engineering Economics and Cost Analysis
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	-
Description	The fundamentals of engineering economy are very crucial for the engineers. The contents include basic concepts such as Cost Estimation Techniques, Price Changes and Exchange Rates, The Time Value of the Money, Project Evaluation and Selection among Alternatives, Evaluation Projects with the Benefit-Cost Ratio Method, Probabilistic Risk Analysis, Replacement Analysis, Breakeven and Sensitivity Analysis.
Objectives	<p>Applying the appropriate engineering economics analysis method(s) for problem solving present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.</p> <p>Comparing the life cycle cost of multiple projects using the methods learned, make a quantitative decision between alternate facilities and/or systems and evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.</p> <p>Applying all mathematical approach models covered in solving engineering economics problems: mathematical formulas, interest factors from tables, Excel functions and graphs.</p> <p>Developing a cash flow for each alternative solution of a project, convert one type of cash flow to another type of cash flow using compounding factors and Excel Financial Functions.</p>
Learning Outcomes	<p>By the end of the course, the student will be able to</p> <p>LO1: Identify relevant economic and financial aspects of an engineering project or problem.</p> <p>LO2: Apply standard time-value equivalence formulas to convert monetary cash flows that occur at different points in time into comparable quantities.</p> <p>LO3: Compare multiple alternatives for an engineering project, loan, lease, or investment with respect to appropriate financial measures.</p> <p>LO4: Interpret taxes and depreciation for equivalent-value calculations and understand their implications for the choice for the best alternative, the optimal replacement schedule for machine and equipment, etc.</p> <p>LO5: Apply the effect of uncertainty on financial decision making and the analyze engineering economic situations involving uncertainties in such aspects as product prices, input costs, investment returns, etc.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	3	0	0	1	0	0	0	0	0	0	0	0
LO2	0	0	0	3	0	2	0	0	0	0	0	0
LO3	0	0	0	3	0	2	0	0	0	0	0	0
LO4	0	0	0	0	0	2	0	0	0	0	0	0
LO5	0	0	0	0	0	2	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Cost Concepts and Design Economics	L01
The Time Value of the Money	L02
Evaluation a Single Project	L02, L03
Comparison and Selection among Alternatives	L04
Depreciation and Income Taxes	L02, L03
Price Changes and Exchange Rates	L05
Price Changes and Exchange Rates	L05
Replacement Analysis	L05
Evaluation Projects with the Benefit-Cost Ratio Method	L03, L04, L05
Breakeven and Sensitivity Analysis	L01, L02, L05
Probabilistic Risk Analysis	L05

DERS BİLGİLERİ

Kodu	IE 346
İsmi	Mühendislik Ekonomisi ve Maliyet Analizi
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	-
İçerik	Mühendislik ekonomisinin temel ilkeleri ve bilgileri mühendisler için önem arz etmektedir. Bu ilkeler ve teknikler fizibilite çalışmalarında, tasarım sırasında karar vermede ve ekipman seçimi ve değiştirme analizlerinde kullanılabilir. Öğrenciler farklı zaman noktalarında gerçekleşen nakit para akışlarını birbiriyle kıyaslanabilir miktarlara dönüştürmek için standart zaman-değer denklik formüllerini uygulamayı öğrenir ve istenen getiri oranına karşın ortaya çıkacak riske göre basit varlıklardan oluşan en uygun portföyü kurma becerisini geliştirir.

COURSE RECORD

Code	IE 348
Name	Marketing Engineering
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall or Spring
Type	Elective
Prerequisites	-
Description	This course explores the development of international marketing programs from the determination of objectives and methods of organization through the execution of research, advertising, distribution, and production activities. Students examine the international similarities and differences in marketing functions as related to the cultural, economic, political, social, and physical dimensions of the environment. Students will explore the changes in marketing systems and the adoption of marketing philosophies and practices to fill conditions in different countries. They will have knowledge about branding and development.
Objectives	Providing necessary background on marketing research, advertising, distribution, and production activities. Recognizing the international similarities and differences related to marketing functions in their cultural, economic, political, social and physical dimensions. Equipping the students with the capability of developing market segmentation and market positioning strategies. Performing marketing engineering projects on case studies.
Learning Outcomes	By the end of the course, the student will be able to LO1: Analyze the fundamental principles involved in marketing engineering. LO2: Construct product, pricing, placement, and promotion strategies. LO3: Demonstrate market segmentation and market positioning strategies. LO4: Summarize the code of ethics and professional conduct. LO5: Examine the interrelationships between market trends, innovation, sustainability, and communication. LO6: Create a team project to apply marketing engineering tools for a company, report effectively and share the results (written and orally) with peers in a professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	2	1	0	4	2	0	0	0	1	0	0	2
L02	0	0	0	0	0	0	0	1	0	3	0	0
L03	3	2	5	1	0	0	0	0	0	0	1	0
L04	0	0	0	0	4	0	1	1	0	0	0	0
L05	2	2	0	0	0	0	0	0	0	5	4	4
L06	3	3	3	4	5	5	5	5	5	5	3	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Marketing	L01
Marketing mix	L01, L02
Strategic Marketing	L03

Marketing Research Process	L01, L03
Qualitative and Quantitative Research Methods	L01, L03
New Product Development and Product Lifecycle Strategies	L03
General Pricing Approaches	L02, L03
Advertising, sales promotion and public relations	L05
Personal Selling and Direct Marketing	L05
Marketing Channels	L03, L05
Channel Management Decisions	L03, L05
Customer Behavior	L05

DERS BİLGİLERİ

Kodu	IE 348
İsmi	Pazarlama Mühendisliği
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz ya da Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Ders, hedeflerin ve organizasyon metotlarının belirlenmesinden araştırma, reklamcılık, dağıtım ve üretim faaliyetlerinin gerçekleştirilmesine kadar uluslararası pazarlama programlarının geliştirilmesi konularını ele almaktadır. Öğrenciler, kültürel, ekonomik, politik, sosyal ve fiziksel boyutlarıyla pazarlama fonksiyonlarıyla ilgili uluslararası benzerlikleri ve farklılıkları öğreneceklerdir. Öğrenciler ayrıca, farklı ülkelerdeki koşullara göre pazarlama sistemleri ile pazarlama felsefe ve uygulamalarındaki değişiklikleri inceleyeceklerdir. Marka oluşturma ve geliştirme hakkında bilgi sahibi olacaktır.

COURSE RECORD

Code	IE 351
Name	Project Management
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall /Spring
Type	Elective
Prerequisites	-
Description	This course provides students an overview of project management, focusing on project initiation and control. A discussion of the different types of projects, the project life cycle as well as the intricacies of defining and monitoring project resources, cost, scope and schedule through work breakdown structures, the precedence diagramming method and earned value analysis among other tools is included. Popular project management software will also be introduced. Concepts are reinforced by case studies covering a wide variety of project types and industries.
Objectives	Understanding what a Project is, the project life cycle, stakeholders and roles, challenges, and importance of project Management. Applying the introduced tools and techniques in initiating and planning a project such as estimating the project budget and cost, developing a project plan, developing a project schedule, management of risks, preparing project proposals Applying different project management processes, tools, and techniques from executing, monitoring and controlling, up to project closure Demonstrating effective and integrative teamwork
Learning Outcomes	By the end of the course, the student will be able to LO1: Apply knowledge of Project Management techniques, approaches, and skills required to balance and implement short and long-range plans for managing projects to completion. LO2: Have analytical and organizational skills required assessing complex project management challenges, and to develop and execute workable action plans. LO3: Use of project management software tools LO4: Work in a project team to manage a project and share the results of the project (written and orally) with peers in a meaningful and professional manner
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	4	5	3	4	2	0	0	0	0	5	3	0
L02	3	3	3	4	2	0	0	0	3	5	0	0
L03	2	3	4	5	4	0	0	0	0	5	0	0
L04	2	2	5	4	5	5	5	3	0	4	0	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to PM and Syllabus Review	L01
Project Life Cycles and the PM Framework; Ethics in PM	L01
Initiating; Stakeholder Management	L01, L02

Planning: Communication Management	L01, L02
Planning: Scope Management, WBS, Time Management	L01, L02
Scope and Time, Demonstration of PM	L01, L02
Planning: Quality and Risk Management	L03, L04
Planning: Cost Management	L03, L04
Planning: HR and Procurement Management	L03, L04
Procurement Management	L03, L04

DERS BİLGİLERİ

Kodu	IE 351
İsmi	Proje Yönetimi
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz /Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders öğrencilere bir projenin başlatılması ve süreç boyunca kontrol edilmesine odaklanan proje yönetimi hakkında genel bir bakış açısı kazandırır. Farklı türlerdeki projeler ve bu projelerin süreçleri ile ilgili tartışma ile birlikte proje kaynaklarının, maliyetinin, hedefinin ve programının iş kırılım yapısı, öncül diyagram metodu, kazanılmış değer analizi gibi araçlarla tanımlanmasını ve takip edilmesini derse dahil edilmiştir. Popüler proje yönetim yazılımları ayrıca tanıtılır. Konseptler çeşitli proje tiplerini ve endüstrilerini içeren vaka analizleri ile desteklenmektedir.

COURSE RECORD

Code	IE 353
Name	Strategic Management
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course provides students a broad introduction to Strategic Management and provide them with the intellectual tools required to manage business and nonbusiness organizations. This course presents the key ideas, principles and instruments, strategy and competitive analysis. The course focuses on the data, analysis, procedures, and skills used by managers to position their organizations and set up strategy in order to influence the performance, success and survival of business and nonbusiness.
Objectives	Introducing the concepts of strategic management and understand its nature in competitive and institutional landscape. Building a framework of analysis which will allow students to diagnostic central issues and problem in complex cases. Building up a superior understanding of the present and future conditions in which organization must function. Developing analytical and decision-making skills for dealing with complex issues in an ethical manner.
Learning Outcomes	By the end of the course, the student will be able to LO1: Describe major theories, background work, concepts, and research output in the field of strategic management. LO2: Demonstrate a skill of strategical thinking about an organization, its business position, how it can increase sustainable competitive advantage and develop plans to ensure long term viability. LO3: Conduct a situational analysis that demonstrates an understanding of an organization, present and conceivable future. LO4: Present operational data and strategic information and own perspectives and choices
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	5	2	3	2	2	0	0	0	0	5	0	0
L02	4	4	5	3	3	0	0	0	0	5	0	0
L03	2	5	4	4	5	0	0	0	0	5	0	0
L04	2	3	4	4	5	0	5	3	0	4	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Strategic Management	L01
The Basis of Strategy: Structure	L01
The levels and formulation of Strategy	L01, L02
Schools of Strategy	L01, L02
Strategy and the performance of organizations	L01, L02
Strategy as a Process	L01, L02

Stakeholder Theory	L01, L02
Term Project Progress Presentation	L01, L02, L04
External Analysis	L01, L03, L04
Internal Analysis	L01, L03, L04
Generic Strategy	L01, L02

DERS BİLGİLERİ

Kodu	IE 353
İsmi	Stratejik Yönetim
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz/Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders öğrenciler için stratejik yönetime kapsamlı bir giriş niteliğindedir ve onlara ticari ve ticari olmayan kuruluşların yönetiminde gerekli olan entelektüel araçları tanıtır. Bu ders anahtar fikirleri, prensipleri, araçları, stratejik ve rakipsel analizleri tanıtır. Ders veriye, analize, prosedürlere ve yöneticilerin kuruluşlarını konumlandırma, başarılarını ve performanslarını etkileme ve ticari ve ticari olmayan kuruluşların hayatta kalma stratejilerini oluşturmak için kullanılan yeteneklere odaklanır.

COURSE RECORD

Code	IE 358
Name	Ergonomics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course introduces ergonomics affording students the necessary knowledge essential for the psychological and anthropometrical development leading to good design such as workload ergonomics, system ergonomics, information ergonomics, product ergonomics and design. Emphasis is placed on health and safety in the workplace. The course also involves application of theory in the form of minor projects. A design project is required, students study make observations of products and workplace design to collect facts for analysis and assessment.
Objectives	Providing necessary knowledge about systems of the human body and its relationship with the tasks and work environment Outlining principles of psychological and anthropometrical development leading to good task and workplace design. Recognizing potential hazards that are likely to cause occupational illnesses or injuries. Equipping the students with the capability of designing tasks, workstations, and work environments ergonomically
Learning Outcomes	By the end of the course, the student will be able to L01: Accurately evaluate hazards which are likely to cause occupational illnesses or injuries. L02: Explain the psychology of human behavior as it relates to workplace safety. L03: Propose appropriate controls for health and safety in the work environment. L04: Design/redesign tasks and workstations to fit employees. L05: Apply the knowledge, skills, and abilities obtained in the course into an industrial based problem. L06: Report the application results effectively and share the results (written and orally) with peers in a professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	4	0	0	0	0	0	0	0	0	0	0	2
L02	0	0	0	0	0	0	0	0	0	0	0	2
L03	4	2	0	3	3	0	2	0	0	2	5	2
L04	3	0	3	0	0	2	0	1	0	0	0	2
L05	3	3	3	3	2	3	0	0	0	3	3	3
L06	3	3	0	0	0	3	5	4	1	0	0	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Foundational Ergonomics	L01
Systems of the Body	L01, L02
Muscular Work and Nervous Control of Movements	L01

Anthropometry	L01
Design of Workplaces and Hand Tools	L03
Workstation design	
Work-Related Musculoskeletal Disorders	L03
Impact on Industry	
Heavy Work & Evaluating Physical Workloads and Lifting	L02, L03
NIOSH Lifting Guidelines	L03
Workplace Stress and Fatigue	L01
Information Ergonomics, Controls, and Displays	L02, L04
Design of Cognitive Work	L02, L04
Usability	L02, L04
How to Implement an Ergonomics Program	L05

DERS BİLGİLERİ

Kodu	IE 358
İsmi	Ergonomi
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz ya da Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, öğrencilere işlerin psikolojik ve antropometrik tasarımı için gerekli iş yükü ergonomisi, sistem ergonomisi, bilgi ergonomisi, ürün ergonomisi ve tasarımı gibi iyi iş ortamı tasarımını destekleyen işbilimi disiplinini ergonomiyi tanıtmaktadır. İş yerinde sağlık ve güvenliğin önemi vurgulanır. Ders ayrıca teorideki bilgi birikiminin projeler şeklinde uygulanmasını da içerir. Öğrencilerin bir tasarım projesi yapması istenmektedir. Projede öğrenciler ürünler ve işyeri tasarımı hakkında gözlemler yaparlar, analiz ve değerlendirme için veri toplayarak ergonomik işyeri tasarımı yaparlar.

COURSE RECORD

Code	IE 374
Name	Supply Chain Management
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course introduces concepts and terminology of logistics and supply chain management, examination of components of logistics and supply chain systems, analysis of interactions and trade-offs among these components, logistics network configuration, risk pooling and multi-echelon inventory systems, value of information in supply chains, coordination of the supply chain using contracts and other mechanisms, distribution strategies for the <u>supply chain and product design for supply chain efficiency.</u>
Objectives	Teaching the components of supply chain and their interactions. Practicing analytical problem-solving techniques to develop solutions for supply chain management and design problems. Developing an understanding of information technology and electronic commerce in supply chain management. Developing the ability to design logistics systems and develop integrated supply chain strategy. By the end of the course, the student will be able to LO1: Explain the components of supply chain and their interactions. LO2: Design logistics systems and develop integrated supply chain strategy. LO3: Explain how to mitigate uncertainty and improve planning in supply chain management. LO4: Use information technology and electronic commerce in supply chain management. LO5: Explain how to design products for supply chain efficiency. LO6: Design a team project to solve a real-world supply chain management problem and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	1	0	0	0	0	0	0	0	0	0	0	0
L02	1	1	1	0	0	0	0	0	0	0	0	0
L03	1	0	0	0	0	0	0	0	0	1	0	0
L04	1	0	0	1	0	0	0	0	0	0	0	0
L05	1	0	1	0	0	0	0	0	0	0	0	0
L06	3	3	3	3	3	3	3	2	2	3	1	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to the concepts and terminology of logistics and supply chain management.	L01
Examination of components of logistics and supply chain systems.	L01
Analysis of interactions and trade-offs among these components.	L01

Logistics network configuration	L02
Risk pooling and multi-echelon inventory systems.	L03
Value of information in supply chains.	L04
Coordination of the supply chain using contracts and other mechanisms	L02, L06
Distribution strategies for the supply chain and product design for supply chain efficiency	L02, L05, L06

DERS BİLGİLERİ

Kodu	IE 374
İsmi	Tedarik Zinciri Yönetimi
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz/ Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, lojistik ve tedarik zinciri yönetiminin kavram ve terminolojisine giriş, lojistik ve tedarik zinciri sistemlerinin bileşenlerinin incelenmesi, bu bileşenler arasındaki etkileşimlerin ve ödeşimlerin analizi, lojistik ağ konfigürasyonu, risk havuzu ve çok aşamalı envanter sistemleri, tedarik zincirinde bilginin değeri, tedarik zincirinin sözleşmeler ve diğer mekanizmalarla koordine edilmesi, tedarik zinciri dağıtım stratejileri ve tedarik zinciri verimliliği için ürün tasarımı konularını içerir.

COURSE RECORD

Code	IE 375
Name	Production and Service Systems Management I
Hour per week	4 (4+0)
Credit	4
ECTS	6
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	IE 211
Description	This course will focus on the design of production and service systems using mathematical, computational, and other modern analytical techniques. In particular, this course will cover forecasting, sales and operations planning, deterministic and stochastic inventory and lot-sizing models and supply chain management.
Objectives	<p>Providing the students with the analytical skills and managerial insights necessary to critically analyze a firm's operations decisions and practices. Integrating material learned in other advanced IE and OR courses to improve the student's understanding of the application of these advanced methods in increasing the performance of production and service systems. Strengthening the student's management skills by applying the technical and theoretical IE and OR material provide throughout the curriculum to both production and service delivery systems.</p> <p>By the end of the course, the student will be able to</p> <p>LO1: Outline the whole picture about operations management in a system. LO2: Illustrate the methods for forecasting demand in the context of operations planning. LO3: Explain the process by which companies go from technical forecasts to aggregate level sales and operations plans. LO4: Use the methods for controlling individual item inventories when product demand is certain and uncertain. LO5: Explain the systemic issues in supply chain management. LO6: Design a team project to solve a real-world problem and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	0	2	0	0	0	0	0	0	0	0	0
L02	4	4	2	2	0	0	0	0	0	0	0	0
L03	4	4	2	2	0	0	0	0	0	0	0	0
L04	4	4	2	2	0	0	0	0	0	0	0	0
L05	4	4	2	2	0	0	4	0	0	0	0	0
L06	5	3	3	3	0	2	5	0	0	0	3	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Forecasting	L01, L02
Sales and Operations Management	L02, L03, L04
Inventory Control Subject to Known Demand	L04, L05, L06
Inventory Control Subject to Uncertain Demand	L04, L05, L06

DERS BİLGİLERİ

Kodu	IE 375
İsmi	retim ve Hizmet Sistemleri Ynetimi-I
Haftalık Saati	4 (4+0)
Kredi	4
AKTS	6
Seviye/Yıl	Lisans/3
Dnem	Gz
Dersin Dili	İngilizce
Tip	Zorunlu
n Şart	IE 211
İçerik	Bu ders matematiksel, sayısal ve diğer modern analitik teknikleri kullanarak retim ve hizmet sistemlerinin tasarımına odaklanacaktır. Bu ders zellikle, tahmin, satıř ve operasyon planlaması, deterministik ve stokastik envanter ve parti boyutlandırma modelleri ve tedarik zinciri ynetimini kapsayacaktır.

COURSE RECORD

Code	IE 376
Name	Production and Service Systems Management II
Hour per week	4 (4+0)
Credit	4
ECTS	6
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	IE 375
Description	This course will focus on the role of computers and data bases in production and service systems. In particular, this course will cover fundamental concepts in developing integrated production management systems including ERP, MPS, MRP, JIT and operations scheduling with emphasis on inventory, lead time, work-order management. Lastly, designing and locating new facilities is also emphasized in this course.
Objectives	<p>Providing the students to gain an understanding of the role of information technologies and automated systems in production and service systems.</p> <p>Identifying the automation of traditional manufacturing and industrial practices, using modern smart technology, industrial revolutions, and Industry 4.0.</p> <p>Integrating material learned in other advanced IE and OR courses to improve the student's understanding of the application of these advanced methods in increasing the performance of production and service systems.</p> <p>Strengthening the student's management skills by applying the technical and theoretical IE and OR material provide throughout the curriculum to both production and service delivery systems.</p> <p>By the end of the course, the student will be able to</p> <p>L01: Explain the role of computers and data bases in production and service systems, describe production planning with emphasis on MPS.</p> <p>L02: Discuss push and pull production control systems: MRP and JIT</p> <p>L03: Use an ERP software.</p> <p>L04: Use the key methods and results for sequence scheduling in a job shop environment.</p> <p>L05: Interpret the major issues faced by a firm when designing and locating new facilities and use the quantitative techniques for assisting with the decision- making process.</p> <p>L06: Design a team project to solve a real-world problem and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	0	1	1	0	0	0	0	0	0	0	0
L02	0	0	1	1	0	0	0	0	0	0	0	0
L03	0	0	0	3	0	0	0	0	0	0	0	0
L04	4	4	2	2	0	0	0	0	0	0	0	0
L05	5	4	2	2	0	2	4	0	0	0	0	0
L06	5	4	3	3	0	2	5	0	2	0	3	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction and Overview of Industry 4.0	L01
ERP Enterprise Resource Planning	L01, L02, L06
MPS Master Production Scheduling	L02, L03
Push Control Systems: MRP	L03, L04, L06
Application of ERP Systems with SAP	L03
Operations Scheduling	L04
Facilities Layout and Location	L05, L06

DERS BİLGİLERİ

Kodu	IE 376
İsmi	Üretim ve Hizmet Sistemleri Yönetimi II
Haftalık Saati	4 (4+0)
Kredi	4
AKTS	6
Seviye/Yıl	Lisans/4
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 375
İçerik	Bu ders, üretim ve hizmet sistemlerinde bilgisayarların ve veri tabanlarının rolüne odaklanacaktır. Özellikle, bu ders ERP, MPS, MRP, JIT, operasyon çizelgeleme dahil olmak üzere entegre üretim yönetim sistemlerinin geliştirilmesindeki temel kavramları, envanter, teslim süresi, iş emri yönetimi üzerinde durarak kapsayacaktır. Son olarak, yeni tesislerin tasarlanması ve yerleştirilmesi de bu derste vurgulanmaktadır.

COURSE RECORD

Code	IE 380
Name	Quality Control and Assurance
Hour per week	3 (3 + 0)
Credit	3
ECTS	4
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	IE 222
Description	Provides students the opportunity to apply their theoretical background in optimization and statistics to quality management/improvement applications. Statistical process control, design of experiments, and acceptance sampling methodology are the three pillars of the course. To improve product and service quality, the course heavily focuses on those methods as well as process optimization.
Objectives	Analyzing production/service processes for quality improvement Using statistical tools for statistical quality control and assurance Making designed experiments to optimize production/service processes
Learning Outcomes	By the end of the course, the student will be able to LO1.Explain the philosophy and basic concepts of quality control/improvement. LO2. Design statistical control charts for variables and attributes of processes LO3. Analyze process capability and measurement system capability. LO4. Make designed experiments to identify significant factors processes and to optimize those factors. LO5. Evaluate various acceptance-sampling techniques
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	1	0	0	0	2	0	2	0	0	0	0	0
LO2	3	0	0	0	4	2	4	0	2	0	0	0
LO3	3	0	0	0	4	2	4	0	3	0	0	0
LO4	2	0	0	0	5	2	4	0	5	0	3	0
LO5	2	0	0	0	4	2	5	0	5	0	3	0
LO6	2	0	0	0	1	1	2	0	0	0	3	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Quality improvement in the modern business environment	L01
The DMAIC process	L01
Methods and philosophy of Statistical Process Control	L02
Control charts for variables	L02
Control charts for attributes	L02
Cumulative sum (CUSUM) and exponentially weighted moving average (EWMA) control charts	L02
Process and measurement system capability	L03
Factorial and fractional factorial experiments for process design and improvement	L04

Process optimization with designed experiment	L04
Lot-by-lot acceptance sampling for attributes	L05
Other acceptance-sampling techniques	L05

DERS BİLGİLERİ

Kodu	IE 380
İsmi	Kalite Kontrol ve Güvenliği
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	4
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 222
İçerik	Öğrencilerin, optimizasyon ve istatistik alanındaki teorik altyapılarını kalite yönetimi/iyileştirme uygulamalarına aktarmaları sağlanır. İstatistiksel süreç kontrolü, deney tasarımı ve muayene kabul metodolojisi dersin üç temel direğidir. Ürün ve hizmet kalitesini artırmak için bu üç ana metodolojinin yanısıra süreç optimizasyonuna da derste ağırlık verilir.

COURSE RECORD

Code	IE 391
Name	Industry Applications I
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This is the first course of a series of four courses designed to improve university-industry collaboration and to enable the students to gain experience in solving real problems of organizations. The students are expected to conduct research to solve a real-world problem in groups under the supervision of the instructor and in collaboration with the experts from the industry. In this context, the students' survey papers related to the problem, visit the organization to analyze the problem and collect data, construct conceptual and analytical models to solve the problem, develop solution methodologies for the proposed models, and apply the models to the problem.
Objectives	Developing university-industry cooperation Enabling students to gain experience in solving real world problems of organizations
Learning Outcomes	By the end of the course, the student will be able to LO1: Define problems of organizations and provide IE solutions. LO2: Gain experience on application of theoretical industrial engineering tools LO3: Contributes to University-Industry cooperation. LO4: Gain experience in developing and concluding of an industry project. LO5: Develop the analytical thinking
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	4	4	0	4	1	0	0	0	0	0	0	0
L02	4	4	0	2	1	0	0	0	0	4	0	0
L03	4	4	2	2	1	0	0	0	0	4	0	0
L04	1	1	5	1	1	0	0	0	0	0	0	0
L05	3	3	3	3	0	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction	L01
Overview of IE tools	L01
Settling Project groups and subjects	L02
Definition of problems and solution methodology	L02
Project progress evaluation I	L03, L04, L05

DERS BİLGİLERİ

Kodu	IE 391
İsmi	Endüstri Uygulamaları I
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, üniversite-sanayi iş birliğini geliştirmek ve öğrencilerin organizasyonların gerçek problemlerini çözmede deneyim kazanmasını sağlamak üzere tasarlanmış dört dersin birincisidir. Öğrenciler, bir öğretim üyesinin gözetiminde ve endüstriden uzmanlarla iş birliği içinde, bir gerçek dünya problemini çözmek için araştırma yapacaktır. Bu kapsamda öğrenciler, probleme ilişkin literatür taraması yapacak, problemi analiz etmek ve veri toplamak için organizasyonu ziyaret edecek, problemi çözmek için kavramsal ve analitik modeller oluşturacak, önerilen modeller için çözüm metodolojileri geliştirecek ve modelleri problemin çözümü için uygulayacaktır.

COURSE RECORD

Code	IE 392
Name	Industry Applications II
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This is the first course of a series of four courses designed to improve university-industry collaboration and to enable the students to gain experience in solving real problems of organizations. The students are expected to conduct research to solve a real-world problem in groups under the supervision of the instructor and in collaboration with the experts from the industry. In this context, the students' survey papers related to the problem, visit the organization to analyze the problem and collect data, construct conceptual and analytical models to solve the problem, develop solution methodologies for the proposed models, and apply the models to the problem.
Objectives	Developing university-industry cooperation Enabling students to gain experience in solving real world problems of organizations
Learning Outcomes	By the end of the course, the student will be able to LO1: Define problems of organizations and provide IE solutions. LO2: Gain experience on application of theoretical industrial engineering tools LO3: Contributes to University-Industry cooperation. LO4: Gain experience in developing and concluding of an industry project. LO5: Develop the analytical thinking
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	4	4	0	4	1	0	0	0	0	0	0	0
L02	4	4	0	2	1	0	0	0	0	4	0	0
L03	4	4	2	2	1	0	0	0	0	4	0	0
L04	1	1	5	1	1	0	0	0	0	0	0	0
L05	3	3	3	3	0	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction	L01
Overview of IE tools	L01
Settling Project groups and subjects	L02
Definition of problems and solution methodology	L02
Project progress evaluation	L03, L04, L05

DERS BİLGİLERİ

Kodu	IE 392
İsmi	Endüstri Uygulamaları II
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, üniversite-sanayi iş birliğini geliştirmek ve öğrencilerin organizasyonların gerçek problemlerini çözmede deneyim kazanmasını sağlamak üzere tasarlanmış dört dersin birincisidir. Öğrenciler, bir öğretim üyesinin gözetiminde ve endüstriden uzmanlarla iş birliği içinde, bir gerçek dünya problemini çözmek için araştırma yapacaktır. Bu kapsamda öğrenciler, probleme ilişkin literatür taraması yapacak, problemi analiz etmek ve veri toplamak için organizasyonu ziyaret edecek, problemi çözmek için kavramsal ve analitik modeller oluşturacak, önerilen modeller için çözüm metodolojileri geliştirecek ve modelleri problemin çözümü için uygulayacaktır.

COURSE RECORD

Code	IE 395
Name	Decision and Risk Analysis
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	IE 212, IE 221
Description	Provides students with fundamental knowledge and skills for decision and risk analysis. The course is divided into three parts: introduction to decision analysis, multi-criteria decision analysis, and multi-objective optimization. The structured rational decision-making process is emphasized in the first part. In the second part, multi-attribute utility theory, analytic hierarchy process, and decision tree are introduced. In the third part, multi-objective optimization and goal programming are discussed.
Objectives	Explaining how people make decisions and decision-making traps. Applying multi-criteria decision analysis tools such as multi-attribute utility theory and analytic hierarchy process. Using multi-objective optimization and goal programming as a decision and risk analysis tool.
Learning Outcomes	By the end of the course, the student will be able to L01. Discuss the decision-making traps. L02. Apply multi-attribute utility theory and analytic hierarchy process for decision analysis and risk analysis and management. L03. Construct decision trees under certainty/uncertainty for single/multiple objectives L04. Make multi-objective optimization and goal programming for decision-making problems in continuous/discrete space. L05. Apply risk analysis and management tools for decision making processes
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	3	3	2	0	0	2	0	0	2	5	0	0
L02	4	3	2	4	3	2	4	0	2	5	0	0
L03	4	3	0	3	3	5	4	0	0	0	3	0
L04	4	3	0	3	3	5	5	0	0	0	3	0
L05	4	3	0	4	3	5	5	0	0	0	3	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction, Decision Traps	L01
Decision Traps	L01
Structure Decisions with Multiple Objectives	L02, L03, L04
Multi-Attribute Utility Theory	L02
Analytic Hierarchy Process	L02
Value-Added Risk Management Framework and Strategies	L05
Decisions with Uncertainty: Decision Trees	L03

Structured Risk Management and Value of Information; Risk Attitude	L05
Multi-Objective Optimization and Goal Programming	L04

DERS BİLGİLERİ

Kodu	IE 395
İsmi	Karar ve Risk Analizi
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	IE 212, IE 221
İçerik	Öğrencilere karar ve risk analizi için temel bilgi ve beceriler sağlar. Ders üç bölüme ayrılmıştır: karar analizine giriş, çok kriterli karar analizi ve çok amaçlı optimizasyon. Birinci bölümde yapılandırılmış rasyonel karar verme süreci üzerinde durulmuştur. İkinci bölümde, çok özellikli fayda teorisi, analitik hiyerarşi süreci ve karar ağacı tanıtılmaktadır. Üçüncü bölümde, çok amaçlı optimizasyon ve hedef programlama tartışılmıştır.

COURSE RECORD

Code	IE 397
Name	Summer Training III
Hour per week	2 (0+2)
Credit	1
ECTS	5
Level/Year	Undergraduate /4
Semester	Spring
Type	Compulsory
Prerequisites	A student who wants to enroll for the course must have studied at least five semesters in the Industrial Engineering (IE) undergraduate program, besides workplace of the internship must be approved by the IE department.
Description	This is the last of three courses designed for internship programs that industrial engineering students are to attend during their education. The students who have attended a summer internship program for the third time register for the course. During the internship program, the students will have first-hand experience to learn the business environment, relationships in the business environment, the business culture, and business processes. The students are assessed considering internship report, presentations, and the internship program coordinator's evaluation during the semester. The students get their ECTS credits for the course in the fourth year. To enroll in the course and get ECTS credits, a student must complete at least 8-week (40-workday) program. For detailed procedures, refer to the IE department's web page.
Objectives	Learning the business environment, relationships in the business environment, the business culture, and business processes. Applying theoretical knowledge acquired from lectures to real-life problems. Being ready for business life after graduation. Increasing job opportunities in IE related business sectors.
Learning Outcomes	By the end of the course, the student will be able to LO1: Apply theoretical knowledge acquired from lectures to real-life problems. LO2: Demonstrate an improvement in personal and professional skills. LO3: Observe and report real-life systems from and IE point of view. LO4: Detect a problem or a possible improvement in real-life processes. LO5: Design a project to solve a real-world problem and share the results of a real-world problem related project (written and orally) with peers in a meaningful and professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	2	2	2	2	2	5	4	3	1	2	0	0
L02	0	0	0	0	0	5	5	3	3	5	4	3
L03	5	5	5	5	5	5	4	4	1	2	0	0
L04	2	2	5	5	5	5	4	4	1	2	0	0
L05	2	2	2	5	5	5	4	4	1	2	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Training, Internship Project/Research	L01, L02, L03
Workplace experience	L04, L05

DERS BİLGİLERİ

Kodu	IE 397
İsmi	Yaz Stajı III
Haftalık Saati	2 (0+2)
Kredi	1
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	Derse kayıt yaptırmak isteyen öğrencinin Endüstri Mühendisliği lisans programında en az beş yarıyıl okumuş olması ve staj yapacağı işyerinin bölüm tarafından onaylanmış olması gerekir.
İçerik	Endüstri mühendisliği öğrencilerinin eğitimleri boyunca alacakları staj programları için tasarlanmış üç dersten sonuncusudur. Üçüncü kez yaz stajı programına katılan öğrenciler derse kayıt olurlar. Staj programı süresince öğrenciler iş ortamını, iş ortamındaki ilişkileri, iş kültürünü ve iş süreçlerini ilk elden öğrenme deneyimine sahip olacaklardır. Öğrenciler, staj raporları, sunumlar ve staj programı koordinatörünün dönem içindeki değerlendirmesi dikkate alınarak değerlendirilir. Öğrenciler ders için AKTS kredilerini dördüncü yılda alırlar. Derse kayıt olabilmek ve AKTS kredisi alabilmek için öğrencinin en az 8 haftalık (40 iş günü) bir programı tamamlaması gerekir. Ayrıntılı prosedürler için Endüstri Mühendisliği bölümünün web sayfasını ziyaret ediniz.

COURSE RECORD

Code	IE 402
Name	Discrete Mathematics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course introduces students to ideas and techniques from discrete mathematics that are widely used in science and engineering. The goal is to teach the students techniques in how to think logically and mathematically and apply these techniques in solving problems. To achieve this goal, students will learn logic and proof, sets, functions, as well as algorithms and mathematical reasoning. Key topics involving relations, counting, and graphs are covered in this course.
Objectives	<p>Providing an understanding on how to construct mathematical arguments clearly, precisely, and unambiguously.</p> <p>Providing proficiency in analyzing an argument's form to determine whether the truth of the conclusion follows necessarily from the truth of the premises.</p> <p>Providing experience in applying abstract concepts to concrete problems</p> <p>By the end of the course, the student will be able to</p> <p>LO1: Explain basic concepts such as sets, functions, and prime numbers.</p> <p>LO2: Apply induction to develop recursive algorithms and make proofs.</p> <p>LO3: Apply different counting principles in problem solving.</p> <p>LO4: Explain relations and partial ordering.</p> <p>LO5: Explain basic graph theory concepts such as isomorphism, connectivity.</p> <p>LO6: Apply abstract concepts from graph theory to solve concrete problems.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	3	1	0	0	0	0	0	0	0	0	0	0
L02	3	2	0	2	0	0	0	0	0	0	0	1
L03	3	2	0	2	0	0	0	0	0	0	0	1
L04	3	1	0	0	0	0	0	0	0	0	0	0
L05	3	1	0	0	0	0	0	0	0	0	0	0
L06	3	2	0	2	0	0	0	0	0	0	0	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Sets, functions, cardinality of sets	L01
Modular arithmetic, primes and greatest common divisor	L01
Congruences and their applications	L01
Induction and well-ordering	L02
Counting and the pigeonhole principle	L03
Counting: permutations and combinations	L03
Counting: generalized permutations and combinations	L03
Advanced counting techniques: recurrence relations	L03
Advanced counting techniques: generating functions	L03
Advanced counting techniques: inclusion/exclusion	L03

Relations: general theory	L04
Relations: equivalence relations and partial orders	L04
Graphs: terminology, graph isomorphisms, connectivity	L05
Graphs: Euler and Hamilton paths, planar graphs, graph coloring	L05, L06

DERS BİLGİLERİ

Kodu	IE 402
İsmi	Ayrık Matematik
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders öğrencilere bilim ve mühendislikte yaygın olarak kullanılan ayrık matematik fikir ve tekniklerini tanıtır. Amaç, öğrencilere mantıksal ve matematiksel düşünme tekniklerini öğretmek ve bu teknikleri problem çözmeye uygulamaktır. Bu amaca ulaşmak için öğrenciler mantık ve ispat, kümeler, fonksiyonlar gibi kavramların yanı sıra çeşitli algoritmalar ve matematiksel muhakeme yöntemlerini öğreneceklerdir. Bu derste ilişkiler, sayma ve grafikleri içeren temel ayrık matematik konuları ele alınmaktadır.

COURSE RECORD

Code	IE 415
Name	Discrete Optimization
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course introduces concepts, theories, and algorithms of integer and combinatorial optimization. Topics include modeling, comparison of alternative formulations, computational complexity, polyhedral theory, valid inequalities, cutting-plane algorithms, enumerative algorithms such as dynamic programming, branch-and-bound, branch-and-cut, heuristic algorithms and techniques to handle large problems such as Benders' decomposition and delayed column generation (and branch-and-price). Applications include graphs, networks, transportation, and scheduling.
Objectives	<p>Providing an understanding of theory, algorithm and applications of combinatorial and integer optimization.</p> <p>Formulating IP models for some real-life decision-making problems and show why one model might be "better" than another equivalent model.</p> <p>By the end of the course, the student will be able to</p> <p>L01: Formulate appropriate problems in practice as combinatorial and mixed integer optimization problems.</p> <p>L02: Compare different models with each other.</p> <p>L03: Apply exact solution methods to solve these models.</p> <p>L04: Apply heuristic solution methods to solve these models.</p> <p>L05: Construct decomposition methods for large size problems.</p> <p>L06: Design a team project to solve a real-world problem with integer and combinatorial optimization and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	2	2	2	0	0	0	0	0	0	0	0	0
L02	1	1	1	0	0	0	0	0	0	0	0	0
L03	0	0	0	3	0	0	0	0	0	0	0	0
L04	0	0	0	3	0	0	0	0	0	0	0	0
L05	0	0	0	3	0	0	0	0	0	0	0	0
L06	3	3	3	3	3	3	3	2	2	3	1	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Formulations and comparisons	L01
Methods of strengthening formulations	L01
Computational complexity for algorithms	L02
Computational complexity for problem classes, P and NP classes	L02
Simplex algorithm	L03
Easily solvable problems, total unimodality	L03

Dynamic programming	L03
Branch and bound algorithms	L03
Heuristics	L04, L06
Polyhedron theory, valid inequalities and strengthening of them	L05, L06
Cutting plane algorithms, branch and cut	L03, L05
Lagrange relaxation, duality	L05
Benders decomposition, column generation, branch and price algorithms	L03, L05

DERS BİLGİLERİ

Kodu	IE 415
İsmi	Kesikli Optimizasyon
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Tamsayılı ve kombinatoriyal eniyileme ile ilgili kavramların, kuramların ve algoritmaların incelenmesi. Ders, modelleme, alternatif formülasyonların karşılaştırılması, hesaplama karmaşıklığı, çokyüzlü kuramı, geçerli eşitsizlikler, kesen düzlem algoritmaları, dinamik programlama, dal-sınır, ve dal-kesi algoritmaları, sezgisel algoritmalar ve Benders ayrıştırması, sütun ekleme yöntemi (ve dal-fiyat yöntemi) gibi büyük ölçekli problemlerle başa çıkabilme yöntemlerini içerir. Grafikler, ağlar, ulaşım ve çizelgelemeye dair uygulamalar ele alınır.

COURSE RECORD

Code	IE 416
Name	Non-Linear Programming
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall /Spring
Type	Elective
Prerequisites	-
Description	Nonlinear programming is used in a variety of applications, ranging from machine learning and data science to finance and engineering. This course provides an introduction to nonlinear programming and covers modelling techniques as well as solution algorithms. This course includes nonlinear optimization problems and their formulations, unconstrained optimization and limited optimization, gradient methods, projection methods, the characteristics of the optimal solutions, sufficient and necessary conditions for optimality, duality and semidefinite programming.
Objectives	Introducing students to the basic theory of nonlinear programming Introducing theoretical methods for determining the characteristics of optimal solutions. Introducing computational methods for finding optimal solutions with computers, and convergence features of these methods Being able to use a software to use solvents such as BARON, CONOPT, MINOS Encoding basic methods in basic programming languages
Learning Outcomes	By the end of the course, the student will be able to L01: Formulate problems encountered in practice as nonlinear optimization problem. L02: Determine if non-linear models are convex or not. L03: Apply basic exact solution methods to solve these models. L04: Develop decomposition methods for large-scale problems. L05: Apply these methods to solve problems.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	5	5	2	2	2	0	0	0	0	0	0	0
L02	3	4	2	2	2	0	0	0	0	0	0	0
L03	4	4	3	2	2	0	0	0	0	0	0	0
L04	5	5	5	5	5	0	0	3	0	0	0	0
L05	4	4	4	3	3	2	3	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Unconstrained optimization and optimality conditions	L01, L03
Gradient based solution methods (Newton ect.)	L01, L03
Constrained optimization	L01, L03
Optimality conditions in constrained optimization	L01, L03
Projection in equality constrained problems	L01, L03
Projection methods, punishment methods	L01, L03
Project Progress Presentations	L05
Barrier, Conditional Gradient methods	L01, L03

Inner point methods for linear programming	L01, L03
Convex analysis	L02
Duality	L01
Gradient suboptimization	L01, L03, L04
Semidefinite programming	L01, L03, L04

DERS BİLGİLERİ

Kodu	IE 416
İsmi	Doğrusal Olmayan Programlama
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz /Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Doğrusal olmayan programlama makine öğrenmesi ve veri biliminden finans ve mühendisliğe kadar çeşitli uygulamalarda kullanılır. Bu ders doğrusal olmayan programlamaya giriş niteliğindedir ve modelleme tekniklerini çözüm yöntemleri ile birlikte ele alır. Bu ders ayrıca doğrusal olmayan optimizasyon problemleri ve onların formülasyonları, kısıtsız optimizasyon ve kısıtlı optimizasyon, gradient metotları, projeksiyon metotları, optimal çözümlerin karakteristiği, optimalite için yeterli ve gerekli koşullar, duality ve semidefinite programlamayı içerir.

COURSE RECORD

Code	IE 417
Name	Heuristic Methods in Optimization
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	Heuristics are methods that seek a fine, but not necessarily optimal solution in a reasonable amount of time. This course will survey a wide range of heuristic methods (greedy heuristics, improvement heuristics constructive heuristics, metaheuristics: simulated annealing, tabu search, genetic algorithms, ant colony optimization), emphasizing their generic characteristics and limitations, and the types of problems to which they are best adapted.
Objectives	Introducing the main heuristic search methods Learning the use of these methods to real life problems.
Learning Outcomes	By the end of the course, the student will be able to LO1: Learn the most common heuristic search methods. LO2. Learn variations of these methods. LO3. Gain knowledge of how and why these techniques work. LO4. Gain knowledge of when these techniques should be applied. LO5. Gain application skills of these methods to real life problems.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	3	2	4	0	0	0	0	0	0	0	0
L02	0	3	2	4	0	0	0	0	0	0	0	0
L03	0	3	2	2	0	0	0	0	0	0	0	0
L04	0	3	2	2	0	0	0	0	0	0	0	0
L05	2	3	2	3	5	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to heuristic search	L01
Combinatorial Optimization Problems	L01, L05
Exact Procedures for Assembly Line Balancing Problem	L02, L03
Heuristic Procedures for Assembly Line Balancing Problem	L02, L03
Simulated Annealing	L02, L03, L04
Evolution Based and Genetic Methods	L02, L03, L04
Tabu Search	L02, L03, L04
Particle Swarm Optimization	L02, L03, L04

DERS BİLGİLERİ

Kodu	IE 417
İsmi	Optimizasyonda Sezgisel Yöntemler
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, makul bir sürede iyi çözümler bulan fakat genelde en iyi çözümü bulamayan sezgisel yöntemlere odaklanmaktadır. Ders geniş yelpazede sezgisel yöntemleri (açgözlü sezgiseller, çözüm kurucu sezgiseller, meta sezgisel algoritmalar; tavlama benzetimi, tabu arama, genetik algoritma, karınca koloni algoritması) ele alacaktır. Sezgisel algoritmaların genel özellikleri, sınırlılıkları ve hangi tip problemler için uygun oldukları incelenecektir.

COURSE RECORD

Code	IE 425
Name	System Dynamics
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	Introduction to systems thinking and system dynamics modelling applied to strategy, organizational change, and policy design. Students study application cases including business cycles, the use and reliability of forecasts, the design of supply chains, service quality management, project management and product development, the dynamics of infectious diseases.
Objectives	Introducing the dynamics of problems Introducing developing hypotheses for problematic dynamic behavior Introducing analysis and validation of computer simulation models Introducing design policies to improve systemic behavior.
Learning Outcomes	By the end of the course, the student will be able to LO1: Formulate hypotheses (words, diagrams and set of model equations) about problematic dynamic systems. LO2: Analyze the structure of the model to discover the endogenous sources of specific dynamic patterns. LO3: Makes policy design and evaluation by making changes in the structure of the models. LO4: Analyze systems with missing defined problematic behavior and develops simulation models. LO5: Describe real world system dynamics problems.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	1	3	2	2	1	0	0	0	0	0	0	0
L02	1	3	2	2	1	0	0	0	0	0	0	0
L03	1	3	2	2	1	0	0	0	0	0	0	0
L04	1	3	2	2	1	0	0	0	0	0	0	0
L05	2	3	2	3	3	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Systems Thinking Methodology	L02
Systems Dynamics	L02, L03
Causal Loop Diagrams	L02, L03
Stock and Flow Diagram	L02, L03
Parameter Estimation and Sensitivity Analysis	L04
Tests for Confidence Building	L01, L03, L04
Scenario Planning and Modelling, System Dynamics Simulation	L02, L03
Software	
Case Study	L02, L03, L05

DERS BİLGİLERİ

Kodu	IE 425
İsmi	Sistem Dinamikleri
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Sistem düşüncesine giriş ve sistem dinamiği modellerinin, strateji, örgütsel değişim ve politika tasarımına uygulanması. Öğrenciler, iş döngüleri, tahminlerin kullanımı ve güvenilirliği, tedarik zincirlerinin tasarımı, hizmet kalitesi yönetimi, proje yönetimi ve ürün geliştirme, bulaşıcı hastalıkların yayılması gibi dinamik vakaları analiz ederler

COURSE RECORD

Code	IE 448
Name	International Marketing Tool: Turquality
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course consists of information about Turquality, the first state-sponsored branding program of the world, designed to increase Turkey's exports by developing strong global brands in detail. The course will include research and advertising, distribution, and production activities, determining the aims and methods of the organizations, research on the development of international marketing programs. Students will examine international similarities and differences in marketing functions in relation to the cultural, economic, political, social and physical dimensions of the environment.
Objectives	Recognizing application and management of "Turquality Program". Introducing the marketing processes and strategies that firms utilize when marketing their products in foreign countries. Providing necessary background on facts and figures of World Economy and Turkish Economy. Equipping the students with the capability of developing strategies for international markets.
Learning Outcomes	By the end of the course, the student will be able to LO1: Outline importance and process of marketing and international marketing LO2: Summarize facts and figures of world economy and Turkish economy. LO3: Illustrate new product development for international markets. LO4: Construct a scheme to demonstrate establishment strategies on foreign markets. LO5: Interpret targets and application steps of Turquality Program LO6: Create a team project to apply Turquality Program for a company, report effectively and share the results (written and orally) with peers in a professional manner.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	2	1	0	4	3	0	0	0	1	0	0	2
L02	1	0	0	0	0	0	3	0	0	0	3	0
L03	0	2	1	0	1	0	0	0	1	2	4	0
L04	3	0	0	4	3	4	4	1	0	2	3	3
L05	2	2	0	0	0	0	0	0	0	2	4	4
L06	2	2	2	4	2	2	2	2	2	2	3	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
What is Marketing?	L01
Introduction to International Marketing	L01
The Importance of International Marketing	

The Fact & Figures of World Economy, The Fact & Figures of Turkey's Economy, International Marketing Environment, Economic/ Financial Environment, Cultural Environment, Political Environment	L01, L02
Marketing Research	L03, L04
International Marketing Strategies Establishment Strategies on Foreign Markets	L03, L04
The New Product Development for International Markets	L03, L04
The price strategies for International Markets	L03, L04, L06
The promotion strategies for International Markets	L03, L04, L06
The place strategies for International Markets	L03, L04
The Importance of Logistics for Foreign Markets	
Government's Supports for International Marketing, Turquality	L05
Mission of Turquality, The Targets of Turquality	L05, L06
Application Process for Turquality	L05, L06
The Process of Turquality	L05, L06

DERS BİLGİLERİ

Kodu	IE 448
İsmi	Uluslararası Pazarlama Aracı: Turquality
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, güçlü global markalar geliştirerek Türkiye'nin ihracatını artırmak için tasarlanmış, dünyanın devlet destekli ilk markalaşma programı Turquality hakkında detaylı bilgiler içermektedir. Ders, araştırma ve reklamcılık, dağıtım ve üretim faaliyetleri, kuruluşların amaç ve yöntemlerinin belirlenmesi, uluslararası pazarlama programlarının geliştirilmesine yönelik araştırmaları içerecektir. Öğrenciler, çevrenin kültürel, ekonomik, politik, sosyal ve fiziksel boyutlarıyla ilgili olarak pazarlama fonksiyonlarındaki uluslararası benzerlikleri ve farklılıkları inceleyeceklerdir.

COURSE RECORD

Code	IE 454
Name	Sustainable Energy Systems
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall/ Spring
Type	Elective
Prerequisites	-
Description	Global warming and fossil fuel depletion increasingly place the development of sustainable energy systems at the top of political agendas around the world. Major investments in new energy technologies and systems to improve energy efficiency and reduce greenhouse gas emissions will continue to grow the coming decades. To meet this challenge this course provides an introduction to current and potential future energy systems, resources, extraction, conversion, and end-use technologies, with emphasis on meeting regional and global energy needs in the 21st century in a sustainable manner.
Objectives	Introducing a quantitative framework to aid in evaluation and analysis of energy technology system proposals in the context of engineering, political, social, economic, and environmental goals. Providing knowledge about the possibilities and limitations of the future's sustainable energy system Introducing scientific, society and ethical aspects of energy systems Building a general perspective about integration of renewable generation into electricity systems
Learning Outcomes	By the end of the course, the student will be able to L01: Describe renewable energy and other energy supply. L02: Describe the concept of sustainable development to an extent that an analysis can be made of different strategies for sustainable energy supply, taking into account ecological, economic and social aspects. L03: Develop an understanding of the magnitude of human energy use at the personal and national level. L04: Discuss scientific, society and ethical aspects related to energy systems. L05: Identify climate and environmental aspects for different energy systems
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	2	3	2	1	0	0	0	0	0	0	0	0
L02	2	1	2	2	0	0	0	0	5	0	5	5
L03	3	2	3	2	2	0	0	0	0	0	3	3
L04	3	3	2	2	0	0	0	4	5	0	5	5
L05	3	1	2	2	1	0	0	4	4	0	5	3

* Contribution Level: 0: None, 1: Very Low 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Review of renewable technologies	L01, L03
Economics of Energy Systems	L01, L05
Fossil Fuels	L01
Climate Change and Climate Modeling	L02, L04, L05
Energy Models	L02
Climate Change Models	L02, L04, L05
Wind power	L01, L02

Hydro power and Solar power	L01, L02
Voltaic power and Thermo-electric power	L01, L02
Fuel Cells	L01, L02
Energy conversion	L02, L04, L05
Integration of renewable generation into electricity systems	L02, L05
Social, Economic, Environmental appraisal of renewable/conventional technology	L01, L05

DERS BİLGİLERİ

Kodu	IE 454
İsmi	Sürdürülebilir Enerji Sistemleri
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz/Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Küresel ısınma ve fosil yakıtların hızlı bir şekilde tükenmesi sürdürülebilir enerji sistemlerinin gelişimini tüm dünyadaki politik gündemlerin en üstüne yerleştirmişti. Enerji verimliliği iyileştirmek ve sera gazı salınımı azaltmak için eni enerji teknolojilerine ve sistemlerine yapılan büyük yatırımlar gelecek yıllarda da artmaya devam edecektir. Bu zorlukla mücadele etmek için, bu derste 21. Yüzyılda bölgesel ve küresel enerji ihtiyaçlarının sürdürülebilir şekilde karşılanmasına vurgu yapılarak mevcut ve potansiyel gelecek enerji sistemleri, enerji kaynakları, enerjinin çıkarılması, koruması ve son kullanım teknolojileri için giriş niteliğinde bilgi verir.

COURSE RECORD

Code	IE 461
Name	Manufacturing Systems
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	Flow line production systems are present in different industrial environments and are utilized to manufacture a large variety of products. Usually, several versions of a standardized product differing from each other by optional components and equipment have to be assembled jointly on assembly lines. This type of decision problems has to be solved when such production systems are installed and operated. Within the scope of this course, different solution approaches for assembly lines will be discussed. Also, different types of manufacturing systems are discussed such as lean manufacturing, cellular manufacturing etc.
Objectives	Applying exact and heuristic solution approaches for the assembly line balancing problem Coding metaheuristics algorithms such as simulated annealing
Learning Outcomes	By the end of the course, the student will be able to LO1: Analyze the different types of manufacturing systems such as cellular manufacturing. LO2: Describe and interpret the basic concepts of Lean Manufacturing Techniques LO3: Construct the mathematical model for the assembly line balancing problem. LO4: Evaluate current situation of the any system and describe the potential problems
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	4	4	0	4	1	0	0	0	0	0	0	0
LO2	4	4	0	2	1	0	0	0	0	4	0	0
LO3	4	4	2	2	1	0	0	0	0	4	0	0
LO4	1	1	5	1	1	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Manufacturing Process	LO1
Group Technology and Cellular Manufacturing Systems	LO1
Lean Manufacturing Systems	LO2
Just In Time	LO3
Production Systems and Assembly Lines	LO3
Assembly Line Balancing Problem	LO3
Exact Procedures for Single Model Assembly Line Balancing Problem	LO4
Heuristic Procedures for Single Model Assembly Line Balancing Problem	LO4
Two-Sided Assembly Line Balancing Problem	LO3, LO4
U-Type Assembly Line Balancing Problem	LO3, LO4

DERS BİLGİLERİ

Kodu	IE 461
İsmi	İmalat Sistemleri
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Akış tipi üretim sistemleri, farklı endüstriyel ortamlarda bulunur ve çok çeşitli ürünlerin imalatında kullanılır. Genellikle, standartlaştırılmış bir ürünün, gerekli bileşenler ve ekipmanlarla birbirinden farklı olan birkaç versiyonu, montaj hatlarında birleştirilir. Bu tür karar problemlerin, üretim sistemleri kurulduğunda ve çalıştırıldığında çözülmesi gerekir. Bu ders kapsamında montaj hatları için farklı çözüm önerileri tartışılacaktır. Ayrıca, yalın üretim, hücresel üretim gibi farklı üretim sistemleri anlatılmaktadır.

COURSE RECORD

Code	IE 462
Name	Lean Manufacturing
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	Lean manufacturing techniques, which are today's most popular manufacturing system, are very important for any manufacturing systems. The course will provide the student with an introduction to lean manufacturing, describing the background behind its development and how evaluations and assessments of production systems are performed. Lean manufacture tools and techniques will be described. Issues relating to employee involvement, improvement teams, training and culture will be presented.
Objectives	Applying basic lean manufacturing techniques. Analyzing the current manufacturing strategies and determine the potential problems.
Learning Outcomes	By the end of the course, the student will be able to LO1: Summarize the principles of lean production. LO2: Describe and interpret the basic concepts of Lean Manufacturing Techniques LO3: Categorize how to evaluate production systems. LO4: Compare the lean approach with the existing manufacturing system
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	3	4	3	0	0	0	0	0	0	0	0	0
LO2	2	4	2	0	0	0	0	0	0	0	0	0
LO3	3	4	2	0	0	0	0	0	0	0	0	0
LO4	5	4	1	0	0	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Lean Manufacturing	LO1
Lean Manufacturing Principles	LO1
Just in Time	LO2
Standard Operation Procedures (SOP)	LO3
Value Stream Mapping	LO3
5S	LO2
Single Minute Exchange of Dies (SMED)	LO2
Kaizen	LO2
Kanban	LO2
Heijunka	LO2
Yamazumi and Milk Run	LO2
Total Productive Maintenance (TPM)	LO4
Kanban	LO4

DERS BİLGİLERİ

Kodu	IE 462
İsmi	Yalın İmalat
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz veya Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Günümüzün en popüler imalat sistemi olan yalın üretim uygulamaları işletmeler için çok önemlidir. Endüstri mühendisleri; şirketler, müşteriler ve üretim ortakları için hızlı, esnek ve odaklanmış sistemleri geliştirmelidir. Ders, öğrenciye üretiminin geliştirilmesinin arka planını ve üretim sistemlerinin değerlendirilmesi ve değerlendirmelerini açıklayan, yalın üretime yönelik bir giriş sunacaktır. Yalın üretim araçları ve teknikleri açıklanacak uygulamaları gösterilecektir. Çalışan katılımı, iyileştirme ekipleri, eğitim ve kültür ile ilgili konular açıklanacaktır.

COURSE RECORD

Code	IE 464
Name	Operations Research Models in Disaster Management
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response, and recovery. The course mainly investigates operations research models used to solve several problems in disaster operations management. The models span issues in mitigation, preparedness, response, and recovery phases of disaster management.
Objectives	<p>Providing an understanding of basic concepts in disaster management, definitions and terminology used in disaster management, types, and categories of disasters.</p> <p>Identifying decision-making problems at various stages of disaster management.</p> <p>Investigating operations research models used to solve several problems in disaster operations management.</p> <p>Providing an understanding of the important role of logistics and supply chain management in different phases of disaster management cycle.</p> <hr/> <p>By the end of the course, the student will be able to</p> <p>L01: Defines and explains disaster and disaster types.</p> <p>L02: Defines and explains disaster management and phases.</p> <p>L03: Describe and explain the risk management process.</p> <p>L04: Classify decision-making problems at various stages of disaster management.</p> <p>L05: Explain the work that can be done for decision making problems at various stages of disaster management and which operational research techniques can be used.</p> <p>L06: Design a team project to solve real-life problem related to disaster management by applying an appropriate OR technique and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	0	0	0	0	0	0	0	0	0	3	0
L02	0	0	0	0	0	0	0	0	0	0	3	0
L03	0	0	0	0	0	0	0	0	0	0	3	0
L04	1	1	1	1	0	0	0	0	0	0	3	0
L05	1	1	1	1	0	0	0	0	0	0	3	0
L06	3	3	3	3	3	3	3	2	2	3	3	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Disaster and types	L01
Disaster Management and stages	L02
Risk Management	L03
Academic Paper Review	L04, L05, L06

DERS BİLGİLERİ

Kodu	IE 464
İsmi	Afet Yönetiminde Yöneylem Araştırması Modelleri
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz / Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Ders, insan faaliyetlerinin neden olduğu afetler ve çevresel felaketlerin yanı sıra, doğanın neden olduğu insan kontrolü dışındaki afetlerde hazırlık, müdahale ve iyileştirme süreçlerine odaklanır. Ders, afet operasyonları yönetimindeki çeşitli sorunları çözmek için kullanılan yöneylem araştırması modellerini inceler. Modeller, afet yönetiminin zarar azaltma, hazırlık, müdahale ve kurtarma aşamalarındaki sorunları kapsar.

COURSE RECORD

Code	IE 472
Name	Production Planning and Scheduling
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course aims at developing both a theoretical understanding and a practical basis for working area. The course covers the following topics: Inventory control, production planning and scheduling, and demand forecasting. The course will include (i) analyze time series data, choose an appropriate forecasting model, and optimize the model; (ii) apply the concepts of sequencing and scheduling in the factory site and their personal lives.
Objectives	Understanding the various components and functions of production planning and control. Evaluating current production plans
Learning Outcomes	By the end of the course, the student will be able to LO1: Determine the interactions between the operations management and their impact on inventory control and production planning and scheduling. LO2: Analyze production and inventory planning. LO3: Develop and analyze capacity planning process. LO4: Apply the concepts of scheduling on the real-life application.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	2	2	0	4	1	0	0	0	0	0	0	0
LO2	4	2	0	2	1	0	0	0	0	0	0	0
LO3	4	4	2	2	1	0	0	0	0	0	0	0
LO4	1	1	1	1	1	0	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Production Planning and Scheduling	L01
Plant Locations and capacity determination	L01
Forecasting	L02
Aggregate Planning	L02
Master Production Scheduling and Material Requirement Planning	L03
Inventory and Capacity Planning	L03
Single Machine Scheduling	L03
Flow shop Problems	L04
Parallel Processing and Batch Sequencing	L04
Network-Based Scheduling	L04
Job Shop Scheduling	L03, L04
Open Shop Scheduling	L03, L04
Manpower Scheduling	L03, L04

DERS BİLGİLERİ

Kodu	IE 472
İsmi	Üretim Planlama ve Çizelgeleme
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders üretim sahasında teorik anlayış ve pratik temel geliştirmeyi amaçlamaktadır. Dersin kapsadığı konular: Envanter kontrolü, üretim planlama ve çizelgeleme ve talep tahmini. Ders içeriği: (i) zaman serisi verilerini analiz etmek, uygun bir tahmin modeli seçmek ve modeli optimize etmek; (ii) sıralama ve çizelgeleme kavramlarını fabrika sahasında ve kişisel yaşamda uygulamak.

COURSE RECORD

Code	IE 474
Name	Humanitarian Logistics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course introduces humanitarian operations, basic concepts and terminologies used in disaster management. The main objective of the course is to investigate humanitarian logistics operations in disaster management cycle and location, routing, allocation and inventory problems in humanitarian logistics. Mathematical models are formulated, and solution methodologies are developed for these problems.
Objectives	<p>Providing an understanding and practical use of global logistics and supply chain management in disaster management.</p> <p>Giving fundamental and advanced knowledge about humanitarian logistics and the design, management, and measurement of supply chains in the humanitarian context.</p> <p>Providing an understanding of the important role of logistics and supply chain management in different phases of disaster management cycle.</p> <p>By the end of the course, the student will be able to</p> <p>LO1: Describe the disaster threat and outline the types and effects of disasters.</p> <p>LO2: Outline an overall picture of specifics about the humanitarian context and how this (may) impact on the design of the supply chain.</p> <p>LO3: Describe the considerations and problem areas of logistics and supply chain management in different types of disasters.</p> <p>LO4: Define different location, routing, allocation (distribution) and inventory problems faced in humanitarian logistics.</p> <p>LO5: Interpret the solutions obtained from the models with respect to the disaster management authority and the people affected by the disasters.</p> <p>LO6: Design a team project to solve a real-world humanitarian logistics problem and share the results of a real-world problem related team project (written and orally) with peers in a meaningful and professional manner.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	0	0	0	0	0	0	0	0	0	3	0
L02	0	0	0	0	0	0	0	0	0	0	3	0
L03	1	1	1	1	0	0	0	0	0	0	3	0
L04	1	1	1	1	0	0	0	0	0	0	3	0
L05	1	1	1	1	0	0	0	0	0	0	3	0
L06	3	3	3	3	3	3	3	2	2	3	3	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Overview of Humanitarian Issues	L02
Disasters and Disaster Management	L01
Humanitarian Logistics Basics	L02

Facility Location	L04, L06
Routing Problems, TSP, VRP	L04, L06
Locating Relief Facilities	L03, L04, L05
Humanitarian Logistics in case of a pandemic	L03, L04, L05
Refugees	L03, L04, L05
Debris Management Operations	L03, L04, L05
Blood Logistics	L03, L04, L05
Evacuation Planning and Management	L03, L04, L05

DERS BİLGİLERİ

Kodu	IE 474
İsmi	İnsani Yardım Lojistiği
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, insani yardım operasyonlarını, afet yönetiminde kullanılan temel kavramları ve terminolojileri tanıtmaktadır. Dersin temel amacı, afet yönetimi döngüsünde insani lojistik operasyonları ve insani lojistikte yer seçimi, rotalama, atama ve envanter problemlerini araştırmaktır. Bu problemler için matematiksel modeller oluşturulmakta ve çözüm metodolojileri geliştirilmektedir.

COURSE RECORD

Code	IE 475
Name	Facility Layout and Location
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course provides fundamental knowledge and skills for facility location, facility layout, production line and material handling. The course covers the three main topics: Facility Location, Facility Layout and Production Line. Facility location focuses on location factors, location analysis with fixed costs and continuous facility location. Facility layout includes objectives, facility layout models, optimal and heuristic procedures and computerized layout planning. Production line concentrates on mass production management, single and mixed-model lines and buffer stocks design and operations. Lastly, definitions, objectives, principles, equipment selection of material handling are discussed.
Objectives	Introducing facility location, facility layout, production line and material handling. Introducing facility layout models, optimal and heuristic procedures, computerized layout planning. Introducing objectives and principles of equipment selection of material handling.
Learning Outcomes	By the end of the course, the student will be able to L01: Have enough knowledge about facility location, facility layout, production line and material handling. L02: Do location analysis with fixed costs and continuous facility location. L03: Achieve computerized layout planning. L04: Solve single facility and multi-facility location problems. L05: Solve facility layout and location problems using advanced location models.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	0	1	3	0	1	0	1	0	0	1	1	0
L02	0	1	2	0	1	0	2	0	0	1	4	2
L03	0	1	4	0	3	0	1	0	0	1	2	0
L04	0	1	4	0	1	0	1	0	0	2	4	0
L05	0	2	3	0	1	0	1	0	0	1	3	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to facility layout and location	L01, L02
Classification of facility layout	L01, L02
The plant layout problem	L01, L03
Computerized layout planning	L01, L02, L03
Single-facility location problems	L04, L05
Multi-objective single facility location	L01, L05

Multi-facility location problems	L04, L05
Storage systems layout	L01, L02
Network location problems	L01, L02
Cyclic Network location problems	L01, L02
Advanced location models	L01, L02, L03

DERS BİLGİLERİ

Kodu	IE 475
İsmi	Tesis Planlama ve Yer Seçimi
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Ders, tesis yeri seçimi, tesis planlama, üretim hattı ve malzeme taşıma hakkında temel bilgi ve becerileri sağlar. Ders üç ana başlık altında incelenir: Tesis Yeri Seçimi, Tesis Planlaması ve Üretim Hattı. Tesis yeri seçimi, yer seçimi faktörleri, sabit maliyetli konum analizi ve sürekli tesis yeri seçimi konularına odaklanır. Tesis planlaması, planlamadaki amaçlar, tesis yerleşim modelleri, eniyi ve sezgisel yöntemler ve bilgisayarlı yerleşim planlaması konularını kapsar. Dersin üretim hattı bölümü, seri üretim yönetimi, tek ve karma model hatları ve tampon stokların belirlenmesi ve işletilmesi üzerinde yoğunlaşmaktadır. Son olarak, malzeme taşımanın tanımları, hedefleri, ilkeleri ve ekipman seçimi ele alınmaktadır.

COURSE RECORD

Code	IE 486
Name	Healthcare Operations Management
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall / Spring
Type	Elective
Prerequisites	-
Description	This course aims to demonstrate the important relationship between operations research and the management of complex health care delivery organizations. The course will include the formulation of competitive strategy in operations management decision areas, including strategic planning, process design, quality control, and staff allocation. This course will be of interest to future health care delivery system managers, operations consultants, and decision-makers in organizations that support health care delivery.
Objectives	<p>Providing a basic knowledge of operational issues in the healthcare industry. Developing problem-solving ability and analytical-thinking ability with respect to healthcare operations issues.</p> <p>Providing a basic understanding of issues such as lean, six-sigma processes, scheduling, and capacity planning.</p> <p>Outlining the level of analysis which varies considerably, from operations strategy to daily control of business processes.</p>
Learning Outcomes	<p>By the end of the course, the student will be able to</p> <p>L01: Apply Operations Management tools and techniques to improve the performance of healthcare delivery systems.</p> <p>L02: Redesign healthcare systems so as to better meet the needs of the community.</p> <p>L03: Use tools that enable us to forecast the short- and long-term healthcare needs and the differences in how patients consume health services.</p> <p>L04: Apply the knowledge, skills, and abilities obtained in the course into a healthcare system-based problem.</p> <p>L05: Report the application results effectively and share the results (written and orally) with peers in a professional manner.</p>
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	4	0	0	0	0	0	0	0	0	0	0	0
L02	4	3	0	3	4	0	0	0	0	0	0	0
L03	2	0	2	0	0	2	0	0	0	0	0	0
L04	2	2	2	2	2	2	0	0	0	0	0	0
L05	2	2	2	4	0	3	0	0	0	0	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Healthcare Operations	L01
Evidence-based Medicine and Pay for Performance	L01, L02
Strategy	L02
Balanced Scorecard	L01
Project Management	L04
Patient Flow	L02

Patient Experience Management	L03
Scheduling	L03
Capacity Management	L03
Risk Management	L02, L03
Quality Management	L01
Supply Chain Management	L02, L03

DERS BİLGİLERİ

Kodu	IE 486
İsmi	Sağlık Alanında Operasyon Yönetimi
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz ya da Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, yöneylem araştırması ve karmaşık sağlık bakımı kuruluşlarının yönetimi arasındaki önemli ilişkiyi ortaya koymayı amaçlamaktadır. Stratejik planlama, süreç tasarımı, kalite kontrolü ve personel tahsisinin de dahil olduğu operasyon yönetimi karar alanlarında rekabet stratejisinin oluşturulmasını kapsamaktadır. Bu ders, gelecekteki sağlık hizmeti sistemi yöneticileri, operasyon danışmanları ve sağlık hizmetlerini destekleyen kuruluşlardaki karar vericilerin ilgi alanına girmektedir.

COURSE RECORD

Code	IE 494
Name	Industry 4.0
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/4
Semester	Fall/Spring
Type	Elective
Prerequisites	-
Description	Industry 4.0, also known as the fourth industrial revolution, is a name for the current trend of automation and data exchange. It includes cyber-physical systems, the Internet of things, cloud computing and cognitive computing, modeling and simulation, and data analytics. The course addresses the concept and implementation of Industry 4.0 together with how industrial engineering and operations research can be useful in several areas of Industry 4.0.
Objectives	Interpreting the elements of digital transformation Designing a production line using Industry 4.0 approaches
Learning Outcomes	By the end of the course, the student will be able to LO1: Identify Industry 4.0 technologies. LO2: Outline Industry 4.0 applications LO3: Examine new ways for digital transformation in business and manufacturing sectors. LO4: Use robotics for Internet of Things (IoT) applications
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	1	3	3	3	3	0	3	3	1	1	2	2
LO2	1	3	3	3	3	0	3	3	1	2	2	2
LO3	3	5	5	5	5	0	3	3	0	2	2	2
LO4	5	5	5	5	5	0	3	3	0	2	2	2

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Internet of Things (IoT) & Industrial Internet of Things (IIoT) & Internet of Services	L01
Digitalization and the Networked Economy	L03
Comparison of Industry 4.0 Factory and Today's Factory	L01
Trends of Industrial Big Data and Predictive Analytics for Smart Business Transformation	L03
Smart Manufacturing	L02
Cyberphysical Systems	L02
Robotic Automation and Collaborative Robots	L02
Support System for Industry 4.0	L02
Cyber Security	L02
Industry 4.0 laboratory	L03
IIoT case studies	L04

DERS BİLGİLERİ

Kodu	IE 494
İsmi	Endüstri 4.0
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/4
Dönem	Güz/Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Dördüncü sanayi devrimi olarak da bilinen Endüstri 4.0, otomasyon ve veri alışverişinin nesnelere seviyesinde yaygınlaştırılmasıdır. Şemsiye bir terim olan Endüstri 4.0 içerisinde siber-fiziksel sistemler, nesnelere interneti, bulut bilişim ve bilişsel bilgi işlem, modelleme ve simülasyon ve veri analitiği gibi bir çok farklı alanı içerir. Bu ders, Endüstri 4.0 uygulamalarının, endüstri mühendisliği ve yönetime araştırması araçları ile entegre edilerek çeşitli alanlarda nasıl daha faydalı uygulanabileceğini ele alır.

COURSE RECORD

Code	IE 499
Name	Capstone Design Project
Hour per week	2 (0 + 2)
Credit	1
ECTS	20
Level/Year	Undergraduate
Semester	Yearly
Type	Compulsory
Prerequisites	160 ECTS, all pre-capstone courses (IE 212, IE 222, IE 376) must be already taken and at least two of them must be successful
Description	This course is a full-year course and starts in Fall semester and continues in Spring semester. The course is a good means for improving university-industry collaboration. The students will gain ability to design a complex system, process, device, or product to solve a real-world problem. In this context, the students will analyze the system, determine the problem(s) in the system, develop conceptual and mathematical models of the system, apply models to solve the problem(s), and prepare a project report. The project will be team-based and conducted to solve a real problem of an organization or a research problem under the supervision of academic and industry advisors. Students are expected to complete the problem analysis and model development phases in the first semester, and to apply the proposed solution methodology to solve the problem, to complete the report, and present the project to an audience in second semester
Objectives	Proposing an industrial engineering project for a real-world problem Solving the project by the industrial engineering mindset and tool set Analyze the output of the project under realistic different scenarios (sensitivity analysis) Creating an (inter)disciplinary engineering and research environment
Learning Outcomes	By the end of the course, the student will be able to LO1. Design an industrial engineering project for a real-world problem. LO2. Investigate relevant literature on the identified problem(s). LO3. Construct a conceptual solution framework. LO4. Translate the conceptual solution to a practical solution that is sound considering practical circumstances including economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints. LO5. Determine the means to convey proposed solution to the stakeholders clearly and effectively in a professional format. LO6. Create engineering/research environment by conducting studies in teams.
Requirements	-

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
L01	5	5	5	5	5	1	3	1	0	5	4	3
L02	5	5	5	5	5	1	1	1	0	5	4	3
L03	5	5	5	5	5	1	1	1	0	5	4	3
L04	5	5	5	5	5	1	1	5	0	5	4	3
L05	1	1	1	3	1	3	5	2	0	0	4	3
L06	2	2	2	2	3	5	5	5	3	0	1	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Weekly meeting on identifying IE problem	L01, L06
Progress presentation session	L05, L06
Weekly meeting on the discussion of related literature	L02, L06
Progress presentation session	L05, L06
Weekly meeting on the discussion of the solution methodology	L03, L06
Progress presentation session	L05, L06
Weekly meeting on the application of the proposed solution(s)	L04, L06
Progress presentation session	L05, L06
Weekly meeting on the application of the proposed solution(s)	L04, L06
Progress presentation session	L05, L06
Weekly meeting on the sensitivity analysis of the proposed solution(s)	L04, L06
Final presentation session	L05, L06

DERS BİLGİLERİ

Kodu	IE 499
İsmi	Bitirme Tasarım Projesi
Haftalık Saati	2 (0 + 2)
Kredi	1
AKTS	20
Seviye/Yıl	Lisans/4
Dönem	Yıllık
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	160 AKTS, tüm hazırlık dersleri (IE 212, IE 222, IE 376) önceden alınmış olmalı ve en az ikisi başarılı olmalıdır.
İçerik	Ders, tam yıllık bir ders olup, Güz döneminde başlar ve Bahar döneminde de devam eder. Ders, üniversite-sanayi işbirliğini geliştirmek için iyi bir araçtır. Öğrencilerin, gerçek dünyadaki bir problemi çözmek için karmaşık bir sistem, süreç, cihaz veya ürün tasarlama becerisini kazanmaları beklenmektedir. Bu bağlamda, öğrenciler, bir sistemi analiz ederek sistemdeki problem(ler)i belirleyecek, sistemin kavramsal ve matematiksel modellerini geliştirecek, problem(ler)i çözmek için modeller uygulayacak ve bir proje raporu hazırlayacaklardır. Proje, bir organizasyonun gerçek bir problemini veya bir araştırma problemini akademik ve endüstri danışmanlarının gözetiminde çözmek için öğrencilerin takım çalışması ile yürütülecektir. Öğrencilerden birinci yarıyılta problem analizi ve model geliştirme aşamalarını tamamlamaları, ikinci yarıyılta ise önerilen çözüm metodolojisini problemi çözmek için uygulama, raporu tamamlama ve projenin sonuçlarını paydaşlara sunmaları beklenmektedir.