

THE CONTENTS OF ALL THE COURSES IN THE PROGRAM
THE COURSE BOOK
AND
SUPPLEMENTARY BOOK LISTS
(Computer Engineering / Information Systems Engineering)

PÎRÎ REİS UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING
COURSE CONTENTS AND COURSE BOOKS

1st Semester

MATE 112 Mathematics I (3+2+0) 4

Functions, Limits and Continuity, Differentiation, Applications of Derivatives, Integration, Applications of Definite Integrals, Transcendental Functions, Techniques of Integration

Course Book:

- Thomas' Calculus, 13th Edition, G. B. Thomas, M. D. Weir, J. R. Hass, Pearson, 2014

Supplementary Books/References:

- Calculus: A Complete Course, 7th Edition, Robert A. Adams and Christopher Essex, Pearson, Canada, 2010.
- Calculus: A New Horizon, Howard Anton, 6th Edition; John Wiley & Sons, 1999.
- Calculus: Early Transcendentals, J. Stewart, D. K. Clegg, S. Watson and L. Redlin, 9th Edition, Cengage Learning, 2020.

MATE 113 Linear Algebra (3+0+0) 3

Systems of linear equations, matrices, determinants, the Euclidean vector space, vector spaces and subspaces, eigenvalues and eigenvectors, diagonalization and quadratic forms, linear transformations.

Course Book:

- H. Anton, C. Rorres, Elementary Linear Algebra, 10 th Edition, Wiley, 2010

Supplementary Books/References:

- B.Kolman, D.R.Hill, Elementary Linear Algebra with Applications, 9th Edition, Pearson, 2007

PHYE 112 Physics I (3+0+2) 4

The course covers the following classical mechanics topics: measurement, estimation, kinematics, Newton's laws, fluids and buoyancy, translational and rotational dynamics, work and energy, linear and angular momenta, equilibrium mechanics and statics.

Course Book:

- Giancoli, C.D. (2008). Physics for Scientists & Engineers, 4th ed. Pearson.

Supplementary Books/References:

- <http://ocw.mit.edu/courses/physics/>

COMP 111 Introduction to Computer Engineering (2+1+0) 2.5

This course introduce the fundamental concepts and techniques to computer engineering (CE) students, with the contemporary themes of CE. It covers several hardware systems, software developments, algorithm design, programming languages, microprocessors, operating systems, computer networks, data structure and data models, database management, Boolean algebra at these levels with engineering concepts and approaches; state-of-the-art knowledge in systems computer software and hardware. One of the important features of this course is that it is integrative in multi-disciplines (computer engineering, software engineering, mathematics and computing, informatics). It covers fundamental aspects of computer science, theoretical knowledge, software engineering, hardware engineering, Internet engineering, and practical applications, as well as perspectives of CE development.

Course Book:

- Textbook J. Glenn Brookshear, “Computer Science: An Overview”, 13th ed. Addison Wesley, 2018.

Supplementary Books/References:

- J. G. Brookshear, D. Brylow, “Computer Science: An Overview”, 13th ed. Pearson, 2018.
- Rifat Çölkesen, “Introduction to Computer Engineering”, DaisyScience, 2017.
- D. Reed, “A Balanced Introduction to Computer Science”, 2nd ed. Prentice Hall, 2008

COMP 112 Computer Programming I (3+0+2) 4

This is an introductory course to Computer Programming that provides elements of PYTHON programming language. Syntax, statements, conditionals, loops, functions, arrays and strings are covered.

Supplementary Books/References:

- www.w3schools.com

TUR C001 Turkish Language I (2+0+0) 0

Language and Culture: Definition of language, classification of languages, relationship between language and culture; Development and Historical Periods of Turkish Language: Alphabets used in writing Turkish, writing revolution, Atatürk and Turkish language; Phonetics: Basic concepts related to phonetics, sound features of Turkish, sound events; Morphology: Basic concepts related to morphology, Turkish suffixes, word formation, types of words; Sentence: Word phrases, elements of sentence, types of sentences; Turkish Vocabulary: Idioms, proverbs, reduplications; Interlingual interaction and Turkish; Current problems of Turkish.

Course Book:

- Lecture notes and materials available at <https://ois.pirireis.edu.tr>

ATA C001 Atatürk Principles and History of Revolution I (2+0+0) 0

Internal and external factors that paved the way for the collapse of the Ottoman Empire
Reformist movements and late-era intellectual movements in the Ottoman Empire in the 19th century
Reformist movements and late-era intellectual movements in the Ottoman Empire in the 19th century
The Armenian Question The occupation of Anatolia, reactions, Mustafa Kemal Pasha's arrival in Samsun, congresses, and organization The convening of the last Ottoman Parliament and the National Pact, preparations for the National Struggle, and the material and moral foundations of this preparation Preparations for the National Struggle, and the material and moral foundations of this preparation The opening and activities of the Turkish Grand National Assembly The Treaty of Sèvres Struggles on the Southern and Eastern Fronts, the establishment of the regular army The Greek Offensive and the battles on the Western Front The Armistice of Mudanya The convening of the Lausanne Conference and the Treaty of Lausanne

Course Book:

- Lecture notes and materials available at <https://ois.pirireis.edu.tr>

Supplementary Books/References:

- Atatürk, M.K. 2010. Gençler İçin Fotoğraflarla Nutuk. Türkiye İş Bankası Yayınları. İstanbul. 978-9944-88-834-9.
- Modern Türkiye Tarihi, Editör; Ahmet ŞİMŞEK, Pegem Akademi Yayınları 2019 Ankara. ISBN 978-405-241-820-8
- AKŞİN Sina, "Kısa 20. Yüzyıl Tarihi, T.İş Bankası Kültür Yayınları, 2. Baskı, İstanbul 2014. ISBN 978-605-332-151-4
- İNALCIK Halil, "Atatürk ve Demokratik Türkiye", Kırmızı Yayınları, 3. Baskı, İstanbul 2009. ISBN 975-00404-0-6
- TURAN Şerafettin, "Türk Devrimi Tarihi" I. Kitap, Bilgi Yayınevi, 1. Basım Ankara 1991. ISBN 975-494-278-1
- KINROSS Lord, " ATATÜRK " Bir Millet'in Yeniden Doğuşu, Sander Yayınları 8. Baskı İstanbul 1981.
- KUTAY Cemal, "Malta Esirleri" Abm Yayınevi, İstanbul 2014.
- Gencer, A-Özel, S. 2006. Türk İnkılap Tarihi. Der Yayınları. İstanbul. 975-353-001-3.
- Toktamış, A. 2010. Türk Devrim Tarihi. Bilgi Üniversitesi Yayınları. İstanbul
- Göze, A. 2010. Türk Devrim Tarihi. Beta Yayınları. İstanbul.
- Kili, S. 2001. Türk Devrim Tarihi. İş Bankası Kültür Yayınları. İstanbul.

2nd Semester

MATE 122 Mathematics II (3+2+0) 4

Sequences and Series, Polar Coordinates, Vectors in Space, Vector-Valued Functions, Functions of Several Variables and Partial Derivatives, Multiple Integrals

Course Book:

- Thomas' Calculus, 13th Edition, G. B. Thomas, M. D. Weir, J. R. Hass, Pearson, 2014

Supplementary Books/References:

- Calculus: A Complete Course, 7th Edition, Robert A. Adams and Christopher Essex, Pearson, Canada, 2010.
- Calculus: A New Horizon, Howard Anton, 6th Edition; John Wiley & Sons, 1999.
- Calculus: Early Transcendentals, J. Stewart, D. K. Clegg, S. Watson and L. Redlin, 9th Edition, Cengage Learning, 2020.

PHYE 122 Physics II (3+0+2) 4

The course covers the following electromagnetism topics: electric charge, force, field, flux, and potential, capacitors, current in materials, DC circuits, magnetic force, field, and flux, Ampère's and Faraday's laws, inductance, electromagnetic waves.

Course Book:

- Giancoli, C.D. (2008). Physics for Scientists & Engineers, 4th ed. Pearson.

Supplementary Books/References:

- <http://ocw.mit.edu/courses/physics/>

COMP 121 Computer Programming II (3+0+2) 4

This course provides a thorough introduction to computer programming using the C language, emphasizing fundamental programming concepts and structured design. Topics include basic programming constructs such as data types, relational and logical operators, control flow statements (selection and repetition), and functions. The course also covers advanced concepts such as pointers, arrays, strings, file processing, and structures. Through a combination of theoretical lectures and practical laboratory exercises, students develop strong problem-solving skills and gain hands-on experience in writing efficient, portable, and well-structured C programs. The course is designed to build a solid foundation for further studies in software development and programming languages.

Course Book:

- C++ How to Program, Paul Deitel & Harvey Deitel, 9th Edition, ISBN: 9780273793298, 2014.

Supplementary Books/References:

- Paul Deitel & Harvey Deitel, C++ How to Program, 9th Edition, ISBN: 9780273793298, 2014.
- C++ How to Program, Paul Deitel & Harvey Deitel, 9th Edition, ISBN: 9780273793298, 2014.

COMP 126 Discrete Mathematics (3+0+0) 3

The course offers an introduction to discrete mathematics oriented towards computer science and engineering. It covers: Fundamental concepts of mathematics. Discrete structures. Boolean algebra. Finite-State Machines.

Course Book:

- Textbook Kenneth Rosen, Discrete Mathematics and Its Applications, 8th Edition, McGraw-Hill, 2019. Alternatively, 7th Edition, 2012.

Supplementary Books/References:

- Other References Mathematics for Computer Science, Eric Lehman, Tom Leighton, and Albert Meyer 2018 (Available Online)

TUR C002 Turkish Language II (2+0+0) 0

Composition Information: Written composition, paragraph and style of expression in paragraphs; Punctuation marks; Writing rules; Written Expression Types and Applications: Thought writing, art writings; Scientific writings and correspondence types; Reading comprehension, critical reading, listening types; Oral Expression: Basic concepts of speaking, body language, speech types, presentation principles and techniques.

Course Book:

- Lecture notes and materials available at <https://ois.pirireis.edu.tr>

Supplementary Books/References:

- KAPLAN, Mehmet (2001).Şiir Tahlilleri II, Dergah Yayınları, İstanbul
- KORKMAZ, Zeynep (2003). Türk Dili ve Kompozisyon Bilgileri, Yargı Yayınevi, Ankara
- AKSAN, Doğan (2009). Her Yönüyle Dil Ana Çizgileriyle Dilbilim, Türk Dil Kurumu Yayınları, Ankara
- ERGİN, Muharrem (1998). Üniversiteler İçin Türk Dili, Bayrak Basım Yayım Tanıtım. İstanbul.
- KARAHAN, Leyla (2010). Türkçede Söz Dizimi, Akçağ Yayınları, Ankara.
- DİLÇİN,Cem (1995).Örneklerle Türk Şiir Bilgisi, Türk Dil Kurumu Yayınları, Ankara.
- KARAALİOĞLU(1995) Seyit Kemal, Sözlü/Yazılı Kompozisyon Konuşmak ve Yazmak Sanatı, İnkılâp Kitabevi,26. Baskı İstanbul.

ATA C002 Atatürk Principles and History of Revolution II (2+0+0) 0

The abolition of the sultanate, the republican regime, and the process of proclaiming the Republic. The characteristics, strategy, importance, and goal of the Turkish Revolution. Reforms in the political and legal spheres. Reforms in the educational and social spheres. Attempts at and reactions to the transition to a multi-party system during Atatürk's era. The economic situation and economic policy in Turkey during the Republican era. Characteristics of Turkish foreign policy during Atatürk's era, membership in the League of Nations, the Balkan Entente, the Sadabad Pact. Remaining problems following the Treaty of Lausanne, the Mosul Question, and the Montreux Convention Regarding the Straits. The Hatay issue and Hatay's incorporation into the homeland. Atatürkist thought system, the principles of republicanism and nationalism. Populism and the principles of statism. Secularism and the principles of revolutionaryism. Türkiye after Atatürk.

Course Book:

- Lecture notes and materials available at <https://ois.pirireis.edu.tr>

Supplementary Books/References:

- Atatürk, M.K. 2010. Gençler İçin Fotoğraflarla Nutuk. Türkiye İş Bankası Yayınları. İstanbul. 978-9944-88-834-9.
- Modern Türkiye Tarihi, Editör; Ahmet ŞİMŞEK, Pegem Akademi Yayınları 2019 Ankara. ISBN 978-405-241-820-8
- AKŞİN Sina, "Kısa 20. Yüzyıl Tarihi, T.İş Bankası Kültür Yayınları, 2. Baskı, İstanbul 2014. ISBN 978-605-332-151-4
- İNALCIK Halil, "Atatürk ve Demokratik Türkiye", Kırmızı Yayınları, 3. Baskı, İstanbul 2009. ISBN 975-00404-0-6
- TURAN Şerafettin, "Türk Devrimi Tarihi" I. Kitap, Bilgi Yayınevi, 1. Basım Ankara 1991. ISBN 975-494-278-1
- KINROSS Lord, " ATATÜRK " Bir Milletten Yeniden Doğuşu, Sander Yayınları 8. Baskı İstanbul 1981.
- KUTAY Cemal, "Malta Esirleri" Abm Yayınevi, İstanbul 2014.
- Gencer, A-Özel, S. 2006. Türk İnkılap Tarihi. Der Yayınları. İstanbul. 975-353-001-3.
- Toktamış, A. 2010. Türk Devrim Tarihi. Bilgi Üniversitesi Yayınları. İstanbul.
- Göze, A. 2010. Türk Devrim Tarihi. Beta Yayınları. İstanbul.
- Kili, S. 2001. Türk Devrim Tarihi. İş Bankası Kültür Yayınları. İstanbul.

CAR C01 Career Planning (1+0+0) 1

Career Planning is a course designed to create career awareness in students and support them on their career journeys. First, students are made to understand their own values. After being made aware of their areas of interest and skill, students are informed about 21st century competencies and then professionals working in different areas in the sector are introduced to their profession and related areas. This course aims to encourage students to make career plans while they are still at the beginning of their undergraduate education; to help them recognize their own competencies and match these competencies with the expectations of the business world, to choose the right areas of work and to settle in these areas after graduation.

Course Book:

- Komisyon, Kariyer Planlama, TOGÜ KARMER, 2021.
- Kemal Öztemel, Kariyer Planlama ve Geliştirme, Pegem Akademi, 2019.
- <https://ytnk.tv/KariyerPlanlamaDersi> adresinde yer alan ders videoları.

Supplementary Books/References:

- Daniel Goleman, Duygusal Zeka - Neden IQ'Dan Daha Önemlidir?, Varlık Yayınları, 2000.
- Turgay Keskin, Beden Dili ve Hitabet, AZ Kitap, 2015.
- Joe Navarro ve Marvin Karlins, Beden Dili, Alfa Yayınları, 2018.
- Serpil Aytaç, Çalışma Yaşamında Kariyer Yönetimi Planlaması, Geliştirilmesi Sorunları, Epsilon Yayınları, 1997.
- Güçlü, N. (2001). Zaman Yönetimi. Kuram ve Uygulamada Eğitim Yönetimi.
- Dave Ellis, Doug Toft, Ed Stupka ,Dave Ellis Doug Toft , Ed Stupka, Stan Lankowitz (2003). Career Planning. (Third Edition)
- Landy, F. & Conte, J. (2010). Work in the 21st Century: An Introduction to Industrial and Organizational Psychology. (4th ed.)

3rd Semester

ENF 211 Probability and Statistics (3+0+0) 3

Topics in probability include discrete and continuous random variables, probability distributions, sums and functions of random variables. Topics in statistics include sample mean and variance, distributions, regression and hypothesis testing.

Course Book:

- Textbook Probability and Statistics for Engineers and scientists, R.E. Walpole, R.H. Myers, S. L. Myers, K. Ye, 7. Basım; Prentice Hall

Supplementary Books/References:

- Mathematical Statistics, I. Miller, M. Miller, 6. Basım; Prentice Hall · A First Course in Probability, S. Ross, 5. Basım; Prentice Hall
- Miller and Freund's - Probability and Statistics for Engineers, 2011.

ENF 216 Differential Equations (4+0+0) 4

First Order Differential Equations, Second Order Linear Differential Equations, Higher Order Linear Differential Equations, Series Solutions of Second Order Linear Equations, The Laplace Transform, Systems of First Order Linear Equations

Course Book:

- Differential Equations with Boundary Value Problems, Dennis G. Zill, Michael R. Cullen, 7th Edition, Brooks Cole Publishing Company, 2009

Supplementary Books/References:

- Elementary Differential Equations and Boundary Value Problems, 7th Edition, John Wiley and Sons Inc., W. E. Boyce, R. C. DiPrima, 2010
- Fundamentals of Differential Equations, 8th Edition, Addison Wesley, K. Nagle, A. B. Saff, E. D. Snider, 2011

ELK 219 Fundamentals of Electronic Circuits (3+0+0) 3

This course provides a rigorous introduction to the fundamental principles of electric circuit theory, with a focus on both direct current (DC) and alternating current (AC) systems. Core topics include the definitions and interrelations of electric charge, current, voltage, and power, as well as the formulation and application of Kirchhoff's current and voltage laws. The behavior of fundamental circuit elements—resistors, voltage and current sources, including their ideal and non-ideal models—is examined in detail. Systematic methods for circuit analysis, including node-voltage and mesh-current techniques, are developed and applied to circuits with independent and dependent sources. The course also covers the principle of superposition, the Thevenin and Norton theorems of one-port network equivalence, and maximum power transfer conditions. Nonlinear circuit components and energy storage elements, such as inductors and capacitors, are also covered. Circuit dynamic response and sinusoidal steady-state analysis using phasor techniques are also covered, providing a theoretical basis for further studies in electrical engineering and related subjects.

Course Book:

- Textbook Rizzoni, Giorgio, and Kearns, James. Principles and Applications of Electrical Engineering ISE. USA, McGraw-Hill US Higher Ed ISE, 2021.

COMP 211 Object-Oriented Programming (3+0+2) 4

This course introduces the fundamental principles of Object-Oriented Programming (OOP) using an OOP-based programming language. Students will learn how to design, implement, and evaluate modular and reusable software systems by applying core OOP concepts such as classes, objects, encapsulation, inheritance, polymorphism, and abstraction. In addition, the course covers the use of Unified Modeling Language (UML) for system design, exception handling techniques for robust coding, and basic design patterns for better software structuring. A practical emphasis is placed on developing small-scale OOP applications, including graphical user interfaces (GUIs), to reinforce theoretical concepts through hands-on experience.

Course Book:

- Deitel, P. J., & Deitel, H. M. (2017). Java (or C++ version): How to program: Early objects (11th ed.). Pearson Education.
- Timothy C Lethbridge, Robert Laganière. Object-Oriented Software Engineering, Practical Software Development using UML and Java, McGrawHill Education, ISBN 0-07-70109082.

Supplementary Books/References:

- Lecture Notes

COMP 212 GUI Programming (3+0+2) 4

This course provides learning the Javascript programming language. The course covers the syntax, idioms, conditions, loops, functions, arrays and strings of the Javascript language. The aim of learning Javascript programming language is to use it in web programming (HTML/CSS)

Supplementary Books/References:

- <https://www.w3schools.com/>

COMP S01 Industrial Training I (0+0+0) 0

4th Semester

COMP 221 Data Structures (3+0+0) 3

This course provides an introduction to data structures, a fundamental area in computer science and engineering. It covers the basic concepts, properties, and usage scenarios of various data structures such as arrays, linked lists, stacks, queues, trees, and graphs. Emphasis is placed on understanding the role of data structures in organizing, storing, and processing data efficiently, as well as their impact on system performance and algorithm design.

Course Book:

- Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C., Introduction to algorithms. MIT press. (2022).

Supplementary Books/References:

- Clifford A. Shaffer. Data Structures and Algorithm Analysis Edition 3.2 (C++ Version)

COMP 222 Computer Networks and Internet (3+0+0) 3

This course aims to provide Computer Engineering students with fundamental knowledge and skills related to computer networks and the Internet. Topics include the purpose and architecture of computer networks, principles of digital communication, and the detailed structure of the OSI reference model — including the Physical, Data Link, Network, Transport, Session, Presentation, and Application layers. The course also covers essential networking components such as the Domain Name System (DNS), network management protocols, network security mechanisms, and the standardization processes that ensure interoperability and reliability of communication systems. Throughout the course, students will develop an understanding of how network protocols function, how data is transmitted and managed across networks, and how to evaluate network performance and security within engineering constraints.

Course Book:

- Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, 5/E, Prentice Hall 2011. ISBN-13: 9780132126953.

Supplementary Books/References:

- Andrew S. Tanenbaum, “Computer networks”, 4/e Prentice-Hall, 2003 ISBN: 0-13-038488-7.
- J.F. Kurose and K.W. Ross, “Computer Networking a Top Down Approach”, 4. ed. ISBN:0-321-49770-8, 2008.
- Fred Halsall, “Data Communications, Computer Networks, and Open Systems”, Addison-Wesley Pub. Co., Mass.
- William Stallings, “Data and Computer Communications”, 7th. Edition, Prentice Hall.

- James F. Kurose, Keith W. Ross, “Computer Networking”, 3rd Edition, Addison Wesley, 2004.
- Douglas Comer, “Internetworking with TCP/IP”, 3th Ed., Prentice-Hall.
- W. Richard Stevens, “TCP/IP Illustrated”, vol. 1 and 2, Addison Wesley, 1994.

ELK 229 Fundamentals of Electronic Devices and Circuits (3+0+0) 3

This course provides a comprehensive introduction to the fundamental principles of electronic devices and circuits. It begins with the operational characteristics of semiconductor components such as diodes, bipolar junction transistors (BJTs), and field-effect transistors (FETs), followed by the development of their equivalent circuit models and practical applications. The course also covers the basic structure and functioning of digital logic circuits and systems, laying the groundwork for digital electronics. In the final weeks, emphasis is placed on electronic instrumentation and measurement techniques used in circuit analysis and design. Through theoretical instruction and practical examples, students will gain the essential knowledge needed to understand, analyze, and design both analog and digital electronic circuits.

Course Book:

- Textbook Rizzoni, Giorgio, and Kearns, James. Principles and Applications of Electrical Engineering ISE. USA, McGraw-Hill US Higher Ed ISE, 2021.

Faculty Elective Course-2 (3+0+0) 3

Social Elective Course (3+0+0) 3

Social Elective Course (3+0+0) 3

5th Semester

COMP 311 Database Management Systems (3+0+2) 4

This course provides a comprehensive introduction to database management systems, focusing on the fundamental concepts, architecture, and relational data models. Students will explore key topics such as data modeling, normalization, and transaction management, along with advanced SQL query techniques. The course also covers physical database design, indexing strategies, query optimization, and the principles of distributed database systems and security. Emphasis is placed on practical skills through the development of a small-scale database application using modern programming languages, enabling students to connect, query, and manipulate relational databases effectively.

Course Book:

- Ramez Elmasri and Shamkant B. Navathe. Fundamentals of Database Systems, 7th edition. Published by Pearson (July 14, 2021) © 2016

Supplementary Books/References:

- Avi Silberschatz, Henry F. Korth, S. Sudarshan. Database System Concepts, Seventh Edition, McGraw-Hill, 2019.
- Vaish G. Getting Started with NoSQL : Your Guide to the World and Technology of NoSQL. Packt Publishing; 2013.

COMP 312 Algorithms (3+0+0) 3

This course contains: Algorithm efficiency, Analysis of computer algorithms, Classification, search, paging and parallelization, Analysis of mathematical algorithms, analysis of network algorithms and probability algorithms, Divide and conquer and transform and conquer approaches, Basic graph structures, functions and algorithms, Random algorithms and their analysis, Dynamic programming algorithms

Course Book:

- Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C., Introduction to algorithms. MIT press. (2022).

Supplementary Books/References:

- Levitin, A., Introduction to Design and Analysis of Algorithms, 2/E. Pearson Education India. (2008)
- Goodrich, M. T., & Tamassia, R., Algorithm design and applications, Hoboken: Wiley. (2015)

COMP 313 Web Programming (3+0+2) 4

This course provides learning the HTML and CSS web programming technologies. The course covers the whole use of HTML elements and CSS of web programming. Using the acquired HTML and CSS knowledge, enhanced web applications, is discussed.

Supplementary Books/References:

- <http://www.w3schools.com/>

ELK 212 Digital Design (2+2+1) 3,5

This course provides a comprehensive introduction to the principles of digital system design and analysis. Topics include number systems, Boolean algebra, logic gates, minimization techniques, combinational logic design (such as adders, multiplexers, decoders), and sequential circuit design (including flip-flops, registers, counters, and finite state machines).

Students will explore the hierarchical design of digital systems, from basic logic circuits to complex modules, with an emphasis on practical implementation and problem-solving. The course also includes hands-on experience using digital simulation tools, preparing students for modern digital system development in electrical and electronics and computer engineering fields.

Course Book:

- Thomas L. Floyd, “Digital Fundamentals”, 11/E (International Edition), Prentice Hall, 2021. ISBN-13: 9780137506309.

Supplementary Books/References:

- M. Morris Mano and Michael D. Ciletti, Digital Design, 5/E, Prentice Hall, January 2012. ISBN-13: 978-0273764526.

Social Elective Course (3+0+0) 3

6th Semester

COMP 322 Operating Systems (3+0+2) 4

This course provides a comprehensive introduction to modern operating systems, focusing on both theoretical foundations and practical implementations. Topics include process management, CPU scheduling, threads, process synchronization, deadlock handling, memory management, file systems, and basic networking and security mechanisms. Through hands-on programming assignments in a Linux environment using C and shell scripting, students will gain practical experience in implementing key operating system functionalities. The course is designed to develop a strong understanding of operating system internals and their role in managing system resources and ensuring efficiency and security in computing systems.

Course Book:

- Operating System Concepts, A. Silberschatz, P. Galvin, G. Gagne, 10th edition, Wiley, April 2018.

Supplementary Books/References:

- Online resources for linux shell scripting

COMP 324 Software Engineering (3+0+0) 3

This course introduces students to the different software development lifecycle (SDLC) phases used in developing, delivering, and maintaining software products. Students will also acquire basic software development skills and understand common terminology used in the software engineering profession. Students will also learn and practice using traditional coding standards/guidelines. Python software development libraries and debugging tools will be explored and used in projects to familiarize students with basic tasks involved in modifying, building, and testing software. The course will also lay the foundation for achieving academic and career success in Software Engineering

Course Book:

- Software Engineering, 10th Edition, Author: by Ian Somerville.

Supplementary Books/References:

- Programming in Python 3 with zyLab

COMP 325 Computer Architecture (3+0+0) 3

Computer evolution and performance issues, number systems and computer arithmetic, Intel Microprocessors (80x86 Architecture), cache memory, internal and external memories, basic

I/O, instruction sets, addressing modes, processor structure and RISC architecture, advanced applications with assembly programming machine codes, Direct Memory Access (DMA), DMA Controlled I/O and Overclocking, mainboards and ports, manufacturing steps of a microprocessor.

Course Book:

- William Stallings, “Computer Organization and Architecture”, 10th Edition, Pearson, 2016.
- M. Moris Mano, Computer System Organisation Prentice Hall, 1999.
- Computer Architecture, Single and Parallel Systems, M. Zargham, Prentice Hall.

Supplementary Books/References:

- Verilog HDL, A guide to Digital Design and Synthesis, Samir Palnitkar, SunSoft Press 1996.
- Computer Organization and Design, The Hardware and Software Interface, D.A.Patterson, Morgan Kaufmann.

Technical Elective Course (3+0+0) 3

Social Elective Course (3+0+0) 3

COMP S02 Industrial Training II (0+0+0) 0

7th Semester

COMP 411 Dissertation Project I (2+3+0) 3.5

This course is the first phase of the undergraduate graduation project process. It focuses on equipping students with the necessary academic and research skills to initiate and plan a scientific study. The course covers thesis proposal development, literature review techniques, academic writing and citation principles, and scientific reporting standards. Students are expected to conduct an extensive literature review, define their research problem, identify appropriate methodologies, and prepare a structured project timetable. Progress is monitored through milestone reports, culminating in the submission of a comprehensive preliminary study for the final dissertation.

ENF 411 Occupational Health and Safety (2+0+0) 2

General overview to occupational health and safety; Informing about laws and regulations; The importance and effects of occupational accidents and occupational diseases; Basic hazards in the workplace; Fire and safety precautions; Risk factors; Working with screened tools, manual lifting and transporting, Personal Protective Equipment; Occupational safety in ship/shipyard and closed area works

Course Book:

- Roger L. Brauer, Safety and Health for Engineers, 4th Ed. Wiley, 2022

Supplementary Books/References:

- Publications of Ministry of Labor and Social Security
- Lecture Notes

Technical Elective Course (3+0+0) 3

Technical Elective Course (3+0+0) 3

Social Elective Course (3+0+0) 3

Faculty Elective Course-1 (3+0+0) 3

8th Semester

COMP 421 Dissertation Project II (2+3+0) 3.5

This course is a continuation of Dissertation Project I and focuses on the execution, analysis, and reporting phases of an engineering research project. Students are expected to finalize their methodology, conduct experimental or simulation studies, interpret their findings, and present their results in accordance with academic standards. The course also involves writing a comprehensive thesis report and delivering an oral presentation of the project outcomes. Emphasis is placed on independent research, scientific integrity, and effective communication of technical information.

Technical Elective Course (3+0+0) 3

Technical Elective Course (3+0+0) 3

Social Elective Course (3+0+0) 3

Faculty Elective Course-2 (3+0+0) 3

SOCIAL ELECTIVE COURSES

HM 001 Humanity and Society (3+0+0) 3

The course scientifically explores and explains the social concepts and forces that shape or societies and personalities. In the course, many concepts are discussed to clarify the human interactions and cultural phenomena. In the 21. century, because of many reasons, we live in a globalized world and understanding the sociological basic elements will assist us to pave our way to the future. The content of the course will assist us to reach this aim.

Course Book:

- John Macionis-Sociology (18.edition)

HM 002 Philosophy of Science (3+0+0) 3

The course is designed to explain science and history of science from philosophical perspective. Several scientific explanations, causation and laws, structure of scientific theories will be given. The course includes the main themes in the philosophy of science, including the nature of causation, explanation, laws, theory, models, evidence, reductionism, probability, teleology, realism and instrumentalism. In addition, the theory of natural selection, ideas of Popper, Lakatos and Leibniz, feminist philosophy of science, logical positivism, the origins of science will be thought.

Course Book:

- Philosophy of Science, A Contemporary Introduction, Alex Rosenberg, 2nd Edition, Routledge, 2005.
- Understanding Philosophy of Science, James Ladyman, Routledge, 2002

Supplementary Books/References:

- An Introduction to the Philosophy of Science, Kent W. Staley, Cambridge University Press, 2014.
- Bilim Felsefesi, Cemal Yıldırım, Remzi Kitabevi, 2013.

HM 003 History of Culture (3+0+0) 3

This one-semester course aims to introduce students to the history of world cultures/civilizations from prehistory to the early modern period with a special emphasis on the Mediterranean Basin. Designed in a chronological and geographical order, the course focuses on such themes as the formation of social and economic patterns, organization of government and political structures, creations of religious values, artistic and philosophical trends, concepts of civilisation and culture, contributions of civilisations to humanity, developments in Europe starting from Middle Ages, Age of Discovery, Industrial Revolution, social revolutions, the effects of civilisations and social movements on the present time. The course aims to introduce cultures that have existed throughout history, from prehistoric times to the present day.

Course Book:

- World History, Cultures, States, and Societies to 1500, E. Berger, G.L. Israel, C. Miller, University of North Georgia Press, 2016.
- The Evolution of Culture, L. A. White, Routledge, 2010.

Supplementary Books/References:

- Papers, thesis, and other relevant documents uploaded to ÖİS
- Documentaries
- Kültür Tarihi, Anadolu Üniversitesi Yayınları.

HM 004 History of Science and Technology (3+0+0) 3

This course enables students to develop their knowledge on world history from the angle of scientific progress. In this course, technological issues starting from early human life up to today are taught. This course designed to analyse specific historical stages in the development of science and technology in terms of main achievements.

Course Book:

- McClellan J. E., Dorn H., Science and Technology in World History. Second Edition. Baltimore: The Johns Hopkins University Press, 2006.

Supplementary Books/References:

- Herd M., Jamison A. Hubris And Hybrids: A Cultural History of Technology and Science. - London-New York: Routledge, 2003.
- Deming David. Science and Technology in World History. Jefferson-London: macfarland&Company, 2010. (3 volume)
- Turnbull David. Masons, Tricksters and Cartographers Comparative Studies in the Sociology of Scientific and Indigenous Knowledge. – London-New York: Routledge, 2003.
- Bernal, J. D. Science in History. – London: Routledge, 1954. (4 Volume)
- Bunch B., Hellemans A., The History of Science and Technology. – Boston, New York: Houghton Milfin, 2004.
- Arthur Edward, Ellard McKenzie, The Major Achievements of Science: The Development of Science from Ancient Times to the Present (History of Science and Technology Reprint Series), Iowa State Pr, History of science and technology reprint series, 1988.
- Bernal J. D. The Social Function of Science. – London: Routledge, 1939.

HM 005 Maritime History and Culture (3+0+0) 3

This course enables the students to develop their knowledge about world maritime history with special interest on Turkish maritime history. In this course, students will learn the periods in world maritime history, the meaning of sea power and maritime strategy, seafaring countries, important maritime events of the Seljuk, Ottomans and the Republic of Türkiye. Maritime culture issues are also taught within the concept of world maritime history.

Course Book:

- Papers, thesis, and other relevant documents uploaded to ÖİS
- Documentaries
- Martin Stopford, Maritime Economics (could be found online. It is also translated by Nobel)
- Lionel Casson, Ships and Seamanship in the Ancient World (translated to Turkish: Antik Çağda Denizcilik ve Gemiler, çev. Gürkan Ergin, Homer Kitapevi, İstanbul, 2002)
- Palmira Brumett, Ottoman Sea Power and Levantine Diplomacy in the Age of Discovery (translated to Turkish: Osmanlı Deniz Gücü, Timaş Yayınları, İstanbul, 2009)
- Lincoln Paine, World Maritime History (English-Turkish)
- Maritime Report: Chamber of Shipping and UNCTAD

Supplementary Books/References:

- Türk Denizcilik Tarihi I-II, Ed. İdris Bostan ve Salih Özbaran / Zeki Arıkan ve Lütfü Sancar, Deniz Basımevi Müdürlüğü, İstanbul, 2009.
- İdris Bostan, Beylikten İmparatorluğa Osmanlı Denizciliği, Kitap Yayınevi, 7.Baskı, İstanbul, 2015.
- Fernand Braudel, Akdeniz: Tarih, Mekân, İnsanlar ve Miras, Çev. Necati Erkurt, Metis Yayınları, İstanbul, 2015
- Türk Bahriyesinin İlkleri, Deniz Basımevi Müdürlüğü, İstanbul, 2014.
- Encyclopedia: TDV İslam (<https://islamansiklopedisi.org.tr/>)

HM 006 History of Civilization (3+0+0) 3

The concepts of civilisation and culture, civilisations that emerged throughout the ages and their contributions to human history, Europe in the Middle Ages, Eastern Roman and Islamic Civilisations, Age of Discoveries, Industrial Revolution, social revolutions, the effects of civilisations and social movements on the present time, globalisation.

Course Book:

- A History of Civilisations, Fernand Braudel, Penguin Books, 1995. History of the World, J.M. Roberts, Penguin Books.
- Fernand Braudel, Uygarlıkların Grameri, çev: M. Ali Kılıçbay, İmge Kitabevi Yayınları, Ankara, 2006.
- J.M. Roberts, Kısa Dünya Tarihi, İnkılap Kitabevi, İstanbul, 2014.
- Tuncer Baykara, Türk Kültür Tarihine Bakışlar, AKM Yay., 2001.
- Articles shared on ÖİS
- Documentaries (Guns, Germs and Steel; BBC World History)
- Uygarlık Tarihi, Eskişehir, A.Ö.F. Yayın Nu. 1262, 2013.

HM 007 International Relations and Globalization (3+0+0) 3

(This course description belongs to the pre-2025 curriculum. The syllabus is under review. Updated content =and readings will be posted once approved.)

This course aims to provide students with the tools necessary to understand globalization with its different dimensions. The course aims to examine the impact of globalization on political,

economic and social changes, and what opportunities and constraints it poses for the individual, society and global society by using theoretical and historical approaches together. In the course, the concept of globalization will be examined in a theoretical and historical framework. Students will be informed about the causes, nature and effects of the globalization process. The effects of globalization on national and international developments and issues, its positive and negative sides, the issues criticized by its advocates and opponents and opponents are among the topics to be examined.

Course Book:

- Ian Clark, "Globalization and International Relations Theory", Oxford University Press, 1999.
- Paul R. Viotti, Mark V. Kauppi International Relations and World Politics: United States Edition
- Andrew Heywood, Global Politics, 2011

HM 008 Science and Society in Modern Times (3+0+0) 3

History of science offers us a great chance to observe and comprehend the footsteps of the mankind's struggle on the earth and his attempts to learn the secrets of the universe. Since the birth of the civilization, there have been different periods that is worth to study in terms of the evolution of science. Especially, the Scientific Revolution that took place between 16th and 17th centuries is a period that paved way to the contemporary science we enjoy today. This period's distinguished scientist fought against the dogmatic views of their time to understand the world they lived on and beyond. Science and Society in the Modern Times course will mainly focus on the Scientific Revolution and the following scientific periods such as the Industrial Revolution and more.

Course Book:

- Andrew Johnson-*Scientists: An Epic of Discovery*
- John Gribbin: *A Brief History of Science*
- Cemal Yıldırım: *Bilim Tarihi*

FRA 102 French I (3+0+0) 3

This course covers basic grammar to enable students to communicate in French at a simple level. It includes numbers, colors, adjectives, basic verbs and prepositions used in everyday life, and simple sentence structures. It also covers techniques for forming sentences and asking questions in the past tense.

Course Book:

- Taxi method

RUS 101 Basic Russian I (3+0+0) 3

This course aims to introduce students to the Russian language at a basic level. By blending reading, comprehension, speaking, listening, and writing skills, students are encouraged to read short, simple texts, grasp the core message of messages and announcements, and utilize the necessary phrases and sentences to communicate information on key topics. This course

develops students' basic reading, comprehension, speaking, and writing skills using critical thinking strategies.

Course Book:

- Lecture notes and materials available at <https://ois.pirireis.edu.tr>

Supplementary Books/References:

- www.kahoot.it
- Время говорить по-русски
- https://www.irlc.msu.ru/irlc_projects/speak-russian/time_new/rus/course/

CHN 101 Basic Chinese I (3+0+0) 3

(This course description belongs to the pre-2025 curriculum. The syllabus is under review. Updated content and readings will be posted once approved.)

This course will cover a wide range of activities to develop basic language skills such as reading, speaking, listening and writing, with exercises to enrich students' vocabulary, from general terms to words specific to Marine Sciences. Topics covered: features of the basis of the Chinese language of the articulation and phonological system, greeting and farewell, articulation of consonants and vowel formation, main phonemes, self-introduction, features of Chinese word making, the Chinese intonation system and the intonation and semantic structure of the Chinese dialogue, thanking, questioning to ask and some question words, simple sentences, gender categories of nouns as subject, personal and possessive pronouns, numbers as subject gender categories of nouns, gender category, numbers case system of nouns for different communicative purposes: place, direction, time, etc. numbers, plural forms of nouns, giving information about self, personal information, work and occupation, time, months, days of the week telephone conversations.

Course Book:

- New Concept Chinese 1, Beijing Language and Culture University Press

SPN 101 Spanish I (3+0+0) 3

Basic Spanish vocabulary and grammar and the Common European Framework of Reference for Languages A1 level preparatory work.

Course Book:

- Lecture notes and materials available at <https://ois.pirireis.edu.tr>
- Jaime Corpas, Eva García, Agustín Garmendia (2020). Aula Internacional Plus 1. Curso de Español. Difusión. S.L. Barcelona.
- Alonso, R. Catañeda, A. Martínez, P. Miquel, L. Ortega, J. y Ruiz, J.P. (2005).
- Gramática Básica del Estudiante de Español. Ed. Difusión. S.L. Barcelona
- Neus Sans Baulenas, Ernesto Martín Peris (2003). Gente 1 Nueva Edición. Ed. Difusión. S.L.

ENF 111 Academic English I (3+0+0) 3

The course is aimed to develop essential academic English skills to an upper-intermediate level. All four skills (reading, writing, speaking and listening) are covered on this course at word, sentence and text levels, focusing on a number of different academic English genres.

Course Book:

- Students are required to have a copy of a course guide

Supplementary Books/References:

- Bailey, S. “Academic Writing: A handbook for international students”, Routledge, 2018
- McCarthy, M. “Academic Vocabulary in Use”, 2nd Edition with Answers, Cambridge University Press, 2016

ENF 121 Academic English II (3+0+0) 3

This two-credit course is designed for students who wish to develop their English further for academic purposes within the specific disciplines of engineering. Students must write for a variety of audiences and with different purposes—both during their studies and beyond. In the classes, various types of academic writing, in particular, reports and presentations, will be considered.

Course Book:

- Students are required to have a copy of a course guide

Supplementary Books/References:

- Bailey, S. “Academic Writing: A handbook for international students”, Routledge, 2018
- McCarthy, M. “Academic Vocabulary in Use”, 2nd Edition with Answers, Cambridge University Press, 2016

ENF 122 Business English I (3+0+0) 3

The course is about the usage of English in business life for optimal success. The course contains the cases in business life and related English terminology. It is endorsed with audios, visuals and reading texts.

Course Book:

- D. Cotton, D. Falvey, S. Kent-Market Leader (Pre-Intermediate) (3rd Edition)

ENF 322 Law (3+0+0) 3

This course aims to provide knowledge about fundamental principles and concepts of Turkish law. The methodology during offering this course is mainly based upon discussing/lecturing different branches of law under classical public - private law separation.

Course Book:

- Kemal Gözler, Hukukun Temel Kavramları, Bursa, Ekin, Güncellenmiş 22. Baskı, 2024

Supplementary Books/References:

- İlhan Helvacı, Introduction to Contract Law, Springer, 2017

ENF 313 Economics (3+0+0) 3

This course provides a comprehensive introduction to the fundamental principles of economics. Students will explore key economic concepts and analytical tools used to understand how individuals, firms, and governments make decisions. Topics include the definition and scope of economics, supply and demand analysis, market equilibrium, consumer and producer theory, and the structure of different market types including perfect and imperfect competition. The course also covers macroeconomic indicators such as national income accounting, inflation, unemployment, and economic growth. Finally, students will examine various economic policies and assess their impacts on the economy

Course Book:

- Karl E. Case, Ray C. Fair, Sharon E. Oster. Principles of Economics, 13th Edition, Pearson, 2019. ISBN-13: 9780135161104

Supplementary Books/References:

- N. Gregory Mankiw, Mark P. Taylor, Economics, 6th Edition, Cengage, 2023, ISBN-13: 978-1473725331
- Glenn Hubbard, Anthony Patrick O'Brien. Economics, 8th Edition, Pearson, 2020. ISBN-13: 9780135957554

ENF 329 Quality Management Systems (3+0+0) 3

ISO 9001:2015 Quality Management System Standard, prepared based on the principles of customer focus, leadership, employee participation, process approach, improvement, evidence-based decision making and relationship management, ensures customer satisfaction and compliance with applicable legal requirements.

Course Book:

- ISO 9001 Standard

Supplementary Books/References:

- ISO 9004, ISO 19011 Standards

ENF 330 Analytical Thinking and Problem Solving Techniques (3+0+0) 3

This course introduces the principles and techniques of analytical thinking and structured problem solving. Students will learn how to define problems clearly, analyze them using

logical and quantitative methods, and generate innovative and effective solutions. Emphasis is placed on real-life case studies, teamwork, and decision-making under uncertainty.

Course Book:

- Messler Jr, R. W. (2013). Engineering problem-solving 101: Time-tested and timeless techniques. McGraw-Hill Education.
- Butterworth, J., & Thwaites, G. (2013). Thinking skills: Critical thinking and problem solving. Cambridge University Press.

IE 442 Ethics in Engineering and Science (3+0+0) 3

The course is about ethical theory and its relationship with science and engineering field in the general sense. The understanding of ethics, its theoretical and practical discussions in the academic circles, especially in scientific and engineering will be the focal points of the lecture.

Course Book:

- Charles Fleddermann , Engineering Ethics, 4th Edition, Prentice Hall, 2012

IE 444 Innovation and Entrepreneurship (3+0+0) 3

This course introduces the fundamentals of innovation and entrepreneurship, focusing on how new ideas are generated, developed, and transformed into viable business opportunities. Students explore key concepts such as design thinking, opportunity recognition, business model development, and startup strategies. Through case studies, teamwork, and project-based learning, the course encourages creative problem-solving and entrepreneurial mindset in both technological and non-technological contexts.

Course Book:

- Richard, Doug. (2013) How to Start A Creative Business: the jargon-free guide for creative entrepreneurs. Newton Abbot: David & Charles ISBN: 978-1-4463-0273-6

Supplementary Books/References:

- The Lean Startup - How Today's Entrepreneurs use Continuous Innovation To Create Radically Successful Businesses' Eric Ries, Crown Business 2011 Web sites: <http://www.slideshare.net/mobile/PaulShawSmith/business-planning-for-startups>
http://www.slideshare.net/mobile/redrocketvc/market-research-for-startups-13977653?qid=84822e7d-9803-4dd8-8366-957089d59fad&v=qfl&b=&from_search=6

IE 453 Total Quality Management (3+0+0) 3

Evolution (history) of TQM, Definitions of quality, Quality award models, Main Concepts in TQM, Quality Standards

Course Book:

- Goetsch, D.L. and Davis, S.B. Quality Management for Organizational Excellence, Pearson, 2016.

VL 001 Volunteering Practices (3+0+0) 3

(This course description belongs to the pre-2025 curriculum. The syllabus is under review. Updated content and readings will be posted once approved.)

Career Planning is a course designed to create career awareness in students and support them on their career journeys. First, students are made to understand their own values. After being made aware of their areas of interest and skill, students are informed about 21st century competencies and then professionals working in different areas in the sector are introduced to their profession and related areas. This course aims to encourage students to make career plans while they are still at the beginning of their undergraduate education; to help them recognize their own competencies and match these competencies with the expectations of the business world, to choose the right areas of work and to settle in these areas after graduation.

Course Book:

- Komisyon, Kariyer Planlama, TOGÜ KARMER, 2021.
- Kemal Öztemel, Kariyer Planlama ve Geliştirme, Pegem Akademi, 2019.
- <https://ytnk.tv/KariyerPlanlamaDersi> adresinde yer alan ders videoları.

Supplementary Books/References:

- Daniel Goleman, Duygusal Zeka - Neden IQ'Dan Daha Önemlidir?, Varlık Yayınları, 2000.
- Turgay Keskin, Beden Dili ve Hitabet, AZ Kitap, 2015.
- Joe Navarro ve Marvin Karlins, Beden Dili, Alfa Yayınları, 2018.
- Serpil Aytaç, Çalışma Yaşamında Kariyer Yönetimi Planlaması, Geliştirilmesi Sorunları, Epsilon Yayınları, 1997.
- Güçlü, N. (2001). Zaman Yönetimi. Kuram ve Uygulamada Eğitim Yönetimi.
- Dave Ellis, Doug Toft, Ed Stupka ,Dave Ellis Doug Toft , Ed Stupka, Stan Lankowitz (2003). Career Planning. (Third Edition)
- Landy, F. & Conte, J. (2010). Work in the 21st Century: An Introduction to Industrial and Organizational Psychology. (4th ed.)

FACULTY ELECTIVE COURSES – 1

ENF 451 Multidisciplinary Engineering Design (3+0+0) 3

This course covers the following topics: Interdisciplinary collaboration and systems thinking in engineering, design thinking, project planning and task assignment, conceptual design and system architecture, communication, team dynamics and decision making.

Course Book:

- Ulrich, K.T. & Eppinger, S.D. (2020). Product Design and Development. McGraw-Hill.

Supplementary Books/References:

- Brown, T. (2009). Change by Design. Harvard Business Press.

ENF 452 Interdisciplinary Design Thinking and Systems Approach (3+0+0) 3

This course covers the following topics: Design thinking, empathy, problem definition, ideation, prototyping and testing; systems approach, system modeling and analysis; multidisciplinary teamwork; project-based application to real-world engineering problems.

Course Book:

- Brown, T. (2019) Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Business
- Meadows, D. (2008). Thinking in systems. Chelsea Green Publishing.

Supplementary Books/References:

- Cross, N. (2023). Design thinking: Understanding how designers think and work. Bloomsbury Publishing.

FACULTY ELECTIVE COURSES - 2

IE 213 Management and Organization (3+0+0) 3

This course introduces the fundamental principles of management and the structure of organizations, focusing on planning, organizing, leading, and controlling functions. It examines organizational behavior, decision-making, leadership styles, and the impact of internal and external environments on management practices. Through case studies and discussions, students gain insights into how organizations operate and how managers can improve effectiveness and efficiency.

Course Book:

- Robbins, S. & Coulter, M. (2016). Management, Upper Saddle River, NJ, Pearson.

Supplementary Books/References:

- Jones, G.R. and George, J.M. (2014). Contemporary Management, New York, McGraw-Hill/Irwin

IE 312 Computer Integrated Manufacturing Systems (3+0+0) 3

This course will also introduce students to how computers are used in manufacturing for a better satisfaction degree by examples.

Course Book:

- Lecture Notes, and Automation, Production Systems, and Computer-Integrated Manufacturing, M.P. Groover, Prentice Hall, 3rd Edition, 2008, ISBN: 0132393212

IE 313 Production Planning and Control (3+0+0) 3

This course aims to provide students with the knowledge and skills necessary to understand the basic structures of production systems, production planning, and control. Students will learn the techniques required to plan, monitor, and manage production processes effectively. The course will cover topics such as the fundamentals of production planning and control, forecasting techniques, inventory management, Material Requirements Planning (MRP), Capacity Requirements Planning (CRP), aggregate production planning, job scheduling, and maintenance/reliability. The course includes analytical methods for developing practical solutions to various planning and control problems encountered in production and service sectors. Students will apply theoretical knowledge to make decisions related to inventory levels, production capacity, workforce, and time management. They will also gain the ability to perform strategic and operational planning to ensure the efficient use of materials and workforce resources in production processes.

Course Book:

- Heizer, J. H., Render, B., Munson C. (2023). Operations Management: Sustainability and Supply Chain Management (Vol. 14). Pearson Prentice Hall

Supplementary Books/References:

- Nahmias, S. (2009) Production and Operations Analysis. McGraw Hill
- Goldratt, E. M., & Cox, J. (2016). The goal: a process of ongoing improvement. Routledge.
- Tanyaş, M., & Baskak, M. (2003). Üretim planlama ve kontrol.

IE 441 Industrial Psychology (3+0+0) 3

The Industrial Psychology course aims to examine human behavior in organizations and understand how these behaviors interact with elements such as workplace productivity,

motivation, leadership, job satisfaction, and performance. The course will provide students with theoretical knowledge about the fundamental concepts, methods, and applications of industrial psychology, as well as demonstrate how this knowledge can be applied in practice. Topics covered in the course include workforce selection, recruitment processes, performance evaluation, group dynamics, stress management, job satisfaction, motivation theories, leadership, and organizational behavior. Additionally, students will gain the ability to analyze organizational structure, workplace relationships, and the overall well-being of employees in the workplace.

Course Book:

- Industrial/Organizational Psychology: An Applied Approach by Michael G. Aamodt
- Work and Organizational Psychology: An Introduction with Attitude by Ian Rothmann & Cary L. Cooper

IE 443 Industrial 4.0

This course provides learning the Internet of Things technologies. The course covers the use of Node Red program running on Raspberry Pi card. Using the Node Red program running on Raspberry Pi card, smart systems are discussed.

IE 448 Scientific Research Methods (3+0+0) 3

Scientific method in academic research, introduction to research. Defining the research problem, research design, survey design, sampling methods, data collection methods. Providing correct references. Research examples related to domestic and international libraries.

Course Book:

- Research Methodology: A Guide for Ph.D. Students: From Proposal to Publication: A Step-by-Step Approach

IE 450 Enterprise Resource Planning (3+0+0) 3

This course provides an overview of ERP systems, covering topics such as organizational structure, enterprise data management, and the development of ERP systems. Students will learn about material management, production planning, sales and distribution, and quality management using ERP tools. The course also includes enterprise database development and concludes with case studies that link ERP theory to real-world practices.

Course Books:

- Enterprise Resource Planning, Mary Sumner, Prentice-Hall, 2005, ISBN: 0131403435, 9780131403437.

IE 452 Customer Relationship Management (3+0+0) 3

Customer Relationship Management (CRM) is a course designed to provide students with a comprehensive understanding of strategies, technologies, and practices used to manage and analyze customer interactions throughout the customer lifecycle. The course explores key concepts such as customer acquisition, retention, loyalty, and the use of CRM software to enhance business performance. Emphasis is placed on leveraging data to build long-term customer relationships and create value for both the customer and the organization.

Course Book:

- Customer Relationship Management Concepts, Applications, and Technologies. Fifth Edition
- Daniel Prior, Francis Buttle and Stan Maklan. Taylor&Francis Group

Supplementary Books/References:

- Customer Relationship Management Concepts and Tools, Buttle & Maklan, 4th Edition, 2019, Routledge, UK and USA
- Customer Relationship Management, Peelan& Beltman, Second Edition, 2014 Pearson, USA

IE 476 Project Management (3+0+0) 3

This course discusses the factors necessary for successful project management. Topics include project management concepts, requirement definition, project manager, teams, project organization, project communication, project planning, scheduling, control, and associated costs. Software tools for project management will be an integrated part of the course.

Course Book:

- Project Management A Managerial Approach, Jack R. Meredith- Samuel J.Mantel, Jr. 2.Successful Project Management, Jack Gido- James P.Clements 3. Gray, C., & Larson, E. (2003). Project Management: The managerial approach. (2 nd Ed.) McGraw-Hill Irwin. Boston, Ma. With CD-ROM.

TECHNICAL ELECTIVE COURSES

COMP 321 System Analysis and Design (3+0+0) 3

This course provides in-depth coverage of system analysis and design including project management, analysis, design, installation and operation. The course also includes UML design with Object Oriented Approaches. The course briefly covers case studies.

Course Book:

- Alan Dennis, Barbara Haley Wixom, and David Tegarden. 2012. Systems Analysis and Design with UML (2th or 4th. ed.). Wiley Publishing

Supplementary Books/References:

- GOMAA, H. Software Modeling and Design : UML, Use Cases, Patterns, and Software Architectures. Cambridge: Cambridge University Press, 2011. ISBN 9780521764148. Disponível em: <https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=361602&site=ehost-live>. Acesso em: 22 fev. 2022

COMP 323 Cyber Security (3+0+0) 3

This course provides a comprehensive introduction to cybersecurity principles, cryptographic techniques, and network security protocols. It covers both symmetric and asymmetric encryption methods, message authentication, key distribution, and user authentication mechanisms. Students will explore core topics including transport-level and wireless security, IP security, email protection (PGP, S/MIME, domain keys), and firewall technologies. The course also addresses security threats such as malware and intrusions, along with countermeasures like intrusion detection systems. Legal and ethical considerations in cybersecurity are discussed to promote responsible and professional conduct in the field. Emphasis is placed on both theoretical understanding and real-world applications.

Course Book:

- Textbook Computer Security: Principles and Practice, William Stallings and Lawrie Brown, 4th edition Pearson, 2018.

Supplementary Books/References:

- Network Security Essentials: Applications and Standards, William Stallings, 6th Edition, Pearson, 2017.
- Cryptography and Network Security Principles and Practice, 7th edition, William Stallings, Pearson, 2017.
- Computer Security, D. Gollmann, Wiley, 2011.

COMP 431 Advanced Web Programming (3+0+0) 3

This course provides learning the Django framework. The course covers the use of Django for web design. Using the Django program for web pages will be discussed.

COMP 432 Advanced GUI Programming (3+0+0) 3

In-depth consideration of issues involved in designing and implementing graphical user interfaces, including standalone and distributed applications. It covers interactive, pointerbased, object-oriented, graphical techniques that make up the modern desktop interaction metaphor. Topics include: event-based programming; use of classes; graphics and text in windows; user interaction: mouse and keyboard; animation; user interface tools: menus, subwindow controls and widgets; multimedia; network communication; client/server model; worldwide web applications and services; database applications. Programming GUI applications using modern programming languages.

Course Book:

- John E. Grayson, “Graphical user interfaces for Python programs, Python and Tkinter Programming”.

Supplementary Books/References:

- Course Notes.
- <https://nodered.org/>
- <http://xn--http-4b7a/www.pythonware.com/library/tkinter/introduction/>

COMP 433 Design and Analysis of GUI (3+0+0) 3

User interface basics, requirement gathering techniques, conducting user, task and environment analysis, conceptual design, interaction design, design principles, interaction methods, graphical interface design, web interface design, user interface evaluation process (testing), Front-end concepts.

Course Book:

- D. Stone, C.Jarrett,M.Woodroffe, S.Minocha, Morgan Kaufmann, “User Interface Design and Evaluation”, 2005, ISBN:0-12-088436-4

COMP 434 Game Programming (3+0+0) 3

In this course, the emphasis is on software development and games for computer platforms. Programming and animating key elements of sensors and networking features and graphics that will develop interactive applications and can be used on a wide variety of platforms. Basics of installing Bitbucket and using Git. Source code versioning, difference, synchronizing repositories. Model-View-Controller paradigm. Event-based programming.

Basic computer graphics (drawing lines, shapes, etc.), game physics (collisions, mock shooting, etc.), Animation Basics. Graphic asset management.

Course Book:

- Beginning Game Development with Python and Pygame: From Novice to Professional

COMP 435 Mobile Programming (3+0+0) 3

This course provides a comprehensive introduction to Android application development. It covers the fundamental components of the Android ecosystem, including project structure, lifecycle management, and the use of core components such as Activities, Fragments, and Intents. Students will learn to design responsive user interfaces using modern data binding techniques, manage permissions at runtime, and implement local and cloud-based data storage solutions. The course also explores advanced topics such as notifications, alarms, multimedia integration, and access to device capabilities like location, sensors, and telephony. Through lectures, hands-on practices, and a term project, students gain both theoretical understanding and practical skills in mobile development.

Course Book:

- Lecture Notes

COMP 436 Design Patterns (3+0+0) 3

This course provides a comprehensive study of software design patterns and their applications in object-oriented software development. Students will learn the principles of good software design, understand the catalog of design patterns from creational, structural, and behavioral categories, and gain practical experience in applying these patterns to solve common design problems. The course emphasizes pattern selection, implementation, and the relationships between patterns.

Course Book:

- Freeman, E., & Robson, E., Head First Design Patterns. 2nd Edition, O'Reilly Media (2020)

Supplementary Books/References:

- Martin, R. C., Clean Architecture: A Craftsman's Guide to Software Structure and Design. Prentice Hall (2017)

COMP 437 Introduction to Service Oriented Architecture (3+0+0) 3

SOA Fundamentals and Principles, Introduction to SOA Development Life Cycle, SOA Planning and Service Analysis and Identification, Definition of a logical context for designing Information Systems through Pattern-Based Service Design, Pattern-Based Service Design - The provider perspective, Assessment of Challenges of SOA Development

Course Book:

- Tinny Ng, Jane Fung, Laura Chan, Vivian Mak, “Understanding IBM SOA Foundation Suite: Learning Visually with Examples”.

Supplementary Books/References:

- Dynamic SOA and BPM: Best Practices for Business Process Management and SOA Agility By Marc Fiammante.

COMP 438 Compiler Design and Applications (3+0+0) 3

Compilation process, Optimization of CFAs, Regular expressions, Lexical analysis, Grammars, Syntax analysis, Abstract syntax trees, Semantic analysis, Middle code generation, Parsing (shift reduce), Recursive descent First, Follow, Code optimization, Dynamic memory management, Register assignment, Code Generation. Explaining the difference between compiler and interpreter with T-diagrams, virtual machine design with virtual machine, triples and quadruples. Review of the basic parts of the compiler (preprocessor, browser, syntax parser, semantic parsing, code generation or code interpretation). Simple one-pass compiler example, lexical analysis & syntax parsing techniques, syntax directed compiling, type checking, semantic analysis & programmed type conversions, operator overloading, run time environments for independently compiled partitions, intermediate code generation in triplets or quads.

Course Book:

- A. V. Aho and J. D. Ullman, Principles of Compiler Design. Reading, MA, USA: Addison-Wesley, 1977.
- Cooper, K. D., & Torczon, L. (2022). Engineering a compiler. Morgan Kaufmann.

COMP 439 Internet Technologies (3+0+0) 3

This course provides a comprehensive knowledge of modern web technologies for developing dynamic web applications. Students will learn both frontend and backend technologies for building full-stack web applications.

Course Book:

- Duckett, J., HTML and CSS: Design and Build Websites. John Wiley & Sons, (2011)
- "Eloquent JavaScript" (4th Edition) - Marijn Haverbeke

Supplementary Books/References:

- Brown, E., Web Development with Node and Express. O'Reilly Media, (2019)

COMP 440 Parallel Programming (3+0+0) 3

Fundamentals of Parallel Computing, parallel architectures and scalability, system connections and communication, shared memory models, distributed memory model, algorithm design in distributed computational models; Comparison of parallel and distributed systems in terms of communication, synchronization, system requirements and advanced operating system issues.

Course Book:

- A. Grama, A. Gupta, G. Karypis, V. Kumar, “Introduction to Parallel Computing”, 2nd ed., Pearson, 2003.

Supplementary Books/References:

- M. J. Quinn, “Parallel Computing, Theory and practice”, 2nd ed., McGraw Hill, 1994.

COMP 450 Software Quality Assurance and Testing (3+0+0) 3

The aim and objective of this course is to teach students the concepts and skills needed for SQA and Testing. Software quality assurance (SQA or simply QA) is viewed as an activity that runs through the entire development process. It encompasses activities and related techniques to ensure the implementation of appropriate functionality that satisfy the requirements/needs of its targeted client/users for the intended software system, product, or service as the case may be, both correctly and efficiently

Course Book:

- Mahfuz, A. S. (2016). Software Quality Assurance: Integrating Testing, Security, and Audit. CRC Press.
- Smith, H. T. G. (2020). Software Quality Assurance: A Guide for Developers and Auditors. CRC Press.
- Galin, D. (2004). Software quality assurance: from theory to implementation. Pearson education.
- Naik, K., & Tripathy, P. (2011). Software testing and quality assurance: theory and practice. John Wiley & Sons

COMP 451 Combinational Algorithms and Graph Theory (3+0+0) 3

Combinatorial algorithms, non-deterministic algorithms, p and np classes, np-hard and np-complete problems, fast combinatorial algorithm design, optimization problems, simplex algorithm, duality, primal-dual algorithm, flow algorithms, linear programming, paths and search, trees, networks, circuits, flatness, mapping and independence, connectivity, flow.

Course Book:

- Douglas B. West, “Introduction to graph theory”, Pearson, 2002.

Supplementary Books/References:

- T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, “Introduction to Algorithms”, 3rd ed., MIT press, 2009.

COMP 452 Human Computer Interaction (3+0+0) 3

This course introduces fundamental concepts and methods for designing, implementing, and evaluating user interfaces. Students will learn human-centered design principles, usability engineering methods, and modern interaction techniques. The course covers cognitive psychology principles, design guidelines, prototyping methods, and evaluation techniques for creating effective user experiences.

Course Book:

- Sharp, H., Rogers, Y., & Preece, J., Interaction Design: Beyond Human-Computer Interaction. 5th Edition, Wiley (2019)
- Norman, D., The Design of Everyday Things: Revised and Expanded Edition. Basic Books (2013)

Supplementary Books/References:

- Cooper, A., Reimann, R., Cronin, D., & Noessel, C., About Face: The Essentials of Interaction Design. 4th Edition, Wiley (2014)

COMP 462 Computer Vision (3+0+0) 3

The aim of this course is to focus on computer vision approaches that enable to understand and analyze 2D and 3D real visual data.

Course Book:

- Szeliski, R., Computer vision: algorithms and applications. Springer Science & Business Media, (2022) - Free book is available at: <https://szeliski.org/Book/>
- Forsyth, D. A., & Ponce, J. Computer vision: a modern approach. prentice hall professional technical reference. (2nd edition), (2011)

Supplementary Books/References:

- Prince, S. J. Computer vision: models, learning, and inference. Cambridge University Press. (2012).

COMP 463 Automatic Recognition Technologies (3+0+0) 3

Introducing technologies such as magnetic cards, barcodes, smart cards, RFID, fingerprints. Design and applications of industrial data acquisition systems based on these technologies

Course Book:

- Z-N. Li, M.S. Drew, "Fundamentals of Multimedia", Pearson Prentice Hall Upper Saddle River, NJ, 2004.

Supplementary Books/References:

- David A. Forsyth, Jean Ponce, "Computer vision: A Modern Approach".
- Ramesh Jain, Rangachar Kasturi, Brian G. Schunck, "Machine Vision".

COMP 464 Introduction to Data Mining (3+0+0) 3

This course provides an introduction to data mining concepts and techniques, including data preprocessing, classification, clustering, association rule mining, and anomaly detection. Students will learn to apply these methods to real-world datasets and explore their applications in business intelligence.

Course Book:

- Tan, P., Steinbach, M.S., Karpatne, A., & Kumar, V. (2019). Introduction to Data Mining (Second Edition).

Supplementary Books/References:

- Roy Jafari. (2022). Hands-On Data Preprocessing in Python : Learn How to Effectively Prepare Data for Successful Data Analytics. Packt Publishing.

COMP 465 Big Data and Business Analytics (3+0+0) 3

This course introduces students to various massive data sets that can be structured, semi-structured, or unstructured and sourced from multi-media, social media, cloud platforms, web, IoT and traditional economic and business databases. Students will apply data mining and natural language processing tools to these big data to gain business insights such as hidden patterns, untold facts, unknown correlations, market trends, and customer preferences.

Course Book:

- Raj Kamal, Preeti Saxena, “Big Data Analytics: Introduction to Hadoop, Spark, and Machine-Learning”, McGraw Hill Education, 2019.

COMP 466 Introduction to Machine Learning (3+0+0) 3

This course provides a broad introduction to machine learning, methods through which programs can infer desired behaviour from data.

Course Book:

- Giuseppe Bonaccorso, “Machine Learning Algorithms”, Packt Publishing, 2017
- Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2011
Ethem Apaydin, Introduction to Machine Learning, 2e. The MIT Press, 2010.

Supplementary Books/References:

- Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2011
Ethem Apaydin
- Introduction to Machine Learning, 2e. The MIT Press, 2010.

COMP 467 Internet of Things (3+0+0) 3

This course provides learning the Internet of Things technologies. The course covers the use of Node Red program running on Raspberry Pi card. Using the Node Red program running on Raspberry Pi card, smart systems are discussed.

COMP 468 Smart Manufacturing (3+0+0) 3

Smart factories (Industry 4.0) are the current trend for automation and data sharing in production technologies. It includes cyber-physical systems, internet of things, cloud technology. In smart factories, machines, systems and networks have the ability to independently share data to manage production processes independently. Topics covered in this course are: Cyber-physical structures, embedded systems, decentralized decision systems, flexible production systems, automation, worker machine systems, the role of human in smart systems (management).

Course Book:

- Industry 4.0: Entrepreneurship and Structural Change in the New Digital Landscape, Tessa Devezas, João Leitão, Askar Sarygulov Springer, Feb 28, 2017

Supplementary Books/References:

- Business Information Systems and Technology 4.0: New Trends in the Age of Digital Change, Springer 2018.

COMP 469 Agile Software Programming (3+0+0) 3

Main aim of this course are Developing mobile and web applications, using modern sustainable agile practices, such as backlogs, user stories, velocity charts, and test driven development, to deliver value as quickly as possible to end users, clients, developers, and the development organization.

Course Book:

- Robert C. Martin. “Agile Software Development, Principles, Patterns, and Practices”, Pearson.

Supplementary Books/References:

- Ken Schwaber & Jeff Sutherland, “The Scrum Guide”.
- Eric Ries, “The Lean Startup”. Jez Humble et al., “Accelerate: The Science of Lean Software and DevOps”.
- Birgitta Böckeler & Kevlin Henney, “97 Things Every Scrum Practitioner Should Know”.

COMP 481 Biomedical Information Systems (3+0+0) 3

This course provides a comprehensive introduction to Biomedical Information Systems, emphasizing the integration of medical data acquisition, analysis, and interpretation techniques essential in modern healthcare. Students will explore fundamental concepts of medical procedures, human anatomy and physiology, and the classification of various biomedical data types including imaging modalities, electrophysiological signals, pathological analysis, and bioinformatics. Through a combination of theoretical foundations and practical workshops using MATLAB, Python, or R, students will gain hands-on experience in analyzing complex biomedical datasets, fostering skills necessary for data-driven diagnosis and decision-making in clinical environments.

Course Book:

- Lecture Notes

Supplementary Books/References:

- Lecture Notes

COMP 482 Cloud Computing (3+0+0) 3

Designing software using current applications, cloud computing models, techniques and architectures related to cloud computing.

Course Book:

- T. Erl, E. Barcelo Monroy, Cloud Computing: Concepts, Technology & Architecture. (2nd edition), (2023)

Supplementary Books/References:

- Amazon Web Services (AWS) Public Documentation, available at <https://docs.aws.amazon.com/>
- MS Azure Public Documentation, available at <https://docs.azure.cn/en-us>

COMP 483 Introduction to Network Security and Cryptography (3+0+0) 3

This course provides a comprehensive introduction to the principles and practices of network security and cryptography. It begins with the foundational concepts of information security, including confidentiality, integrity, authentication, and non-repudiation. The course covers symmetric encryption techniques and public-key cryptography, with a focus on message confidentiality, digital signatures, and authentication mechanisms. Key distribution methods, user authentication protocols, and secure network access control techniques are examined in depth. Students will explore contemporary topics such as cloud security, transport-level protection, wireless network vulnerabilities, and secure email communication using PGP, S/MIME, and DKIM. In addition, the course addresses widely-used security protocols like SSL/TLS and IPSec, introduces the fundamentals of blockchain and cryptocurrency technologies, and examines common threats including malware, intrusion detection systems, and firewall architectures. Legal, ethical, and policy-related aspects of cybersecurity are also

discussed, equipping students with a well-rounded understanding of both technical measures and organizational responsibilities in securing digital environments.

Course Book:

- Network Security Essentials: Applications and Standards, William Stallings, 6th Edition, Pearson, 2017.

Supplementary Books/References:

- Computer Security: Principles and Practice, William Stallings and Lawrie Brown, 4th edition Pearson, 2018.
- Cryptography and Network Security Principles and Practice, 7th edition, William Stallings, Pearson, 2017.
- Computer Security, D. Gollmann, Wiley, 2011.

COMP 484 Computer Graphics (3+0+0) 3

Fundamentals of 2-D/3-D computer graphics and modern GPU architecture. Covers rasterisation, transformations, shading, colour models and visibility. Students program with OpenGL/GLSL to render interactive scenes. Emphasis on mathematical reasoning and real-time performance. Culminates in a mini-project showcasing an optimised 3-D demo.

Course Book:

- Hearn, D. & Baker, P. Computer Graphics with OpenGL, Prentice Hall.

Supplementary Books/References:

- Other References Angel, E. & Shreiner, D. Interactive Computer Graphics: A Top-Down Approach with Shader-Based (6th ed.).

COMP 485 Computer Forensics (3+0+0) 3

The aim of this course is to introduce the fundamental concepts and techniques of digital forensics used in investigating cyber crimes. Students will learn about forensic technologies and methodologies to recover, analyze, validate, and preserve digital evidence across various platforms (disk/file systems, operating systems, networks), and will discuss current developments in forensic informatics

Course Book:

- C. Altheide & H. Carvey, Digital Forensics with Open Source Tools. Syngress, 2011. ISBN: 9781597495868

Supplementary Books/References:

- B. Nelson, A. Phillips, & C. Steuart, Guide to Computer Forensics and Investigations (6th ed.). Cengage Learning, 2018.
- C. Easttom, Digital Forensics, Investigation, and Response (4th ed.). Jones & Bartlett Learning, 2021.

ELK 442 Artificial Intelligence (3+0+0) 3

Introduces concepts of Artificial Intelligence. The first part of the course begins with an overview of intelligent agents and agent architectures. We then introduce basic search techniques for problem solving and planning. Adversarial search and the principals of game theory are given. Knowledge representation and logical formalisms using propositional, and first order logic are explained. Planning in partial observable environments is introduced. In the second part, we first give a summary of probability theory for Artificial Intelligence applications. Then machine learning algorithms including supervised and unsupervised learning are discussed. Deep learning is briefly explained. We discuss the applications of AI including computer vision, robotics, and NLP. Finally, we give the impacts of AI in society and ethics.

Course Book:

- Stuart Russell, Peter Norvig, “Artificial Intelligence: A Modern Approach” (3rd Edition), Prentice Hall, ISBN-10: 0-13-604259-7, 2010.

Supplementary Books/References:

- Other References Selected papers (an additional listing of literature will be provided based on the students’ projects)

ELK 443 Control with Fuzzy Logic (3+0+0) 3

This course introduces fuzzy logic theory and its applications in control systems. Students will learn fundamental concepts of fuzzy sets, fuzzy logic operations, and fuzzy inference systems. The course emphasizes the design and implementation of fuzzy logic controllers for various engineering applications including industrial processes, robotics, and automation systems.

Course Book:

- Passino, K.M. & Yurkovich, S., Fuzzy Control, Addison-Wesley (1998)
- Ross, T.J., Fuzzy Logic with Engineering Applications, 4th Edition, Wiley (2017)

Supplementary Books/References:

- Jantzen, J., Foundations of Fuzzy Control: A Practical Approach, 2nd Edition, Wiley (2013)

ELK 456 Embedded Systems (3+0+0) 3

This course introduces the fundamentals of embedded systems, including hardware architecture, programming, real-time operating systems, and interfacing. Students will learn

to design, program, and debug embedded systems using microcontrollers and modern development tools. Practical applications in areas such as IoT, automation, and robotics are emphasized.

Course Book:

- Jonathan W. Valvano, "Embedded Systems: Introduction to Arm® Cortex™-M Microcontrollers", 6th Edition, CreateSpace, 2022.

Supplementary Books/References:

- Marilyn Wolf, "Embedded System Interfacing: Design for the Internet-of-Things (IoT)", Morgan Kaufmann, 2023
- Peter Marwedel, "Embedded System Design", 4th Edition, Springer, 2024.
- ARM, STMicroelectronics, Texas Instruments official documentation (online).

ELK 457 Digital Image Processing (3+0+0) 3

This course delivers an in-depth exploration of Digital Image Processing (DIP) concepts, algorithms, and applications. It covers the mathematical foundations and computational techniques for image acquisition, representation, and manipulation. Core topics include image enhancement in the spatial and frequency domains, convolution-based filtering, color space transformations (e.g., RGB, HSI, YUV), morphological processing, and segmentation techniques. The course also addresses image compression methods (e.g., JPEG) and object recognition strategies. Students will gain practical experience using MATLAB and the Image Processing Toolbox for implementing and evaluating image processing algorithms.

Course Book:

- R.C. Gonzalez, R.E. Woods, S.L. Eddins, "Digital Image Processing Using Matlab", Prentice Hall, 978-0130085191.

Supplementary Books/References:

- R.C. Gonzalez, R.E. Woods, "Digital Image Processing", Prentice Hall, 9780133356724, 2017.
- Al Bovik, "The Essential Guide to Image Processing", Elsevier, 2nd Edition, 978-0-12-374457-9.
- A. Murat Tekalp, "Digital Video Processing", Prentice Hall, 978-0131900752.
- J.G. Proakis, D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Prentice Hall, 978-0133737622.
- S. Mitra, "Digital Signal Processing: A Computer-Based Approach", McGraw-Hill, 978-0077366766.

ELK 458 Digital Video Processing (3+0+0) 3

This course provides comprehensive coverage of digital video processing fundamentals and applications. Students will learn video acquisition, representation, compression, enhancement, and analysis techniques. The course covers modern video coding standards

(H.264/AVC, H.265/HEVC, AV1), video quality assessment, motion estimation, object tracking, and video analytics. Practical implementations using MATLAB, Python/OpenCV, and FFmpeg are emphasized through laboratory sessions.

Course Book:

- Wang, Y., Ostermann, J., & Zhang, Y.Q., Video Processing and Communications, Prentice Hall (2002)
- Bovik, A., The Essential Guide to Video Processing, 2nd Edition, Academic Press (2009)

Supplementary Books/References:

- Other References 1. Szeliski, R., Computer Vision: Algorithms and Applications, 2nd Edition, Springer (2022)

ELK 493 Fundamentals of Signals and Systems (3+0+0) 3

The major topics of the course are as follows: 1. Continuous-time and discrete-time signals. 2. Basic system properties. 3. Linear time invariant systems (LTI), and convolution sum and integral. 4. Fourier series representation of periodic signals. 5. Continuous and discrete-time Fourier transform. 6. Sampling. 7. Laplace transform and its application to the analysis of LTI systems.

Course Book:

- Alan V. Oppenheim, Alan S. Willsky, and S. Hamid Nawab, Signals and Systems, 2/E, Prentice Hall, International Edition, 1997.
- John R. Buck, Michael M. Daniel and Andrew C. Singer, Computer Explorations in Signals and Systems Using Matlab, 2/E, Prentice Hall, 2002.

Supplementary Books/References:

- Hwei Hsu, Schaum's Outline of Signals and Systems, 3/E, McGraw-Hill Education, 2013.

ELK 494 Fundamentals of Digital Signal Processing (3+0+0) 3

The major topics of the course are as follows: 1. Discrete-Time Signals and Systems. 2. Z-Transform and Its Application to the Analysis of LTI Systems. 3. Frequency Analysis of Signals. 4. Frequency-Domain Analysis of LTI Systems. 5. Sampling and Reconstruction of Signals. 6. Discrete Fourier Transform (DFT). 7. Fast Fourier Transform (FFT). 8. Implementation of Discrete-Time Systems. 9. Design of Digital Filters.

Course Book:

- John G. Proakis and D.G. Manolakis, Digital Signal Processing, 4/E, Pearson International Education, 2013.

- John G. Proakis and Vinay K. Ingle, Digital Signal Processing Using MATLAB, 3/E, Brooks/Cole Publishing Company, 2000.

Supplementary Books/References:

- Richard G. Lyons, Understanding Digital Signal Processing, Prentice Hall, 2001.
- J. H. McClellan, R.W. Schafer, and M. A. Yoder, Signal Processing First, Pearson International Edition, 2003.
- John G. Proakis and Vinay K. Ingle, Essentials of Digital Signal Processing Using MATLAB, Cengage Learning, 2011. (ISBN 9781111427382)

ELK 495 Engineering Electromagnetics (3+0+0) 3

This course provides a comprehensive introduction to electromagnetic field theory, with a focus on both electrostatics and magnetostatics in the context of engineering applications. Students begin by reviewing the fundamental laws of vector algebra and coordinate systems, which serve as the mathematical foundation for analyzing vector fields. The course then covers the divergence, curl, and Laplacian operators, leading to the formulation and interpretation of Maxwell's equations. Topics include Coulomb's law, Gauss's law, electric scalar potential, conductors, dielectrics, and electrostatic boundary conditions, followed by the analysis of capacitance, electrostatic energy, and the method of images. The magnetostatics section addresses magnetic forces and torques, the Biot-Savart law, Maxwell's magnetostatic equations, and the concept of vector magnetic potential. The course concludes with a study of magnetic materials, boundary conditions, inductance, and magnetic energy storage. Through theoretical and practical exploration, students gain the essential tools to understand and apply electromagnetic concepts in a wide range of electrical and electronic systems.

Course Book:

- Ulaby, F. T., & Ravaioli, U. (2015). Fundamentals of applied electromagnetics (Vol. 7). Upper Saddle River, NJ: Pearson.

Supplementary Books/References:

- Balanis, C. A. (2012). Advanced engineering electromagnetics. John Wiley & Sons.
- Griffiths, D. J. (2023). Introduction to electrodynamics. Cambridge University Press.
- Cheng, D. K. (1989). Field and wave electromagnetics. Pearson Education India.

ELK 497 Telecommunication Systems (3+0+0) 3

The major topics of the course are as follows : 1.Introduction and Frequency Analysis of Signals and Systems 2.Analog Signal Transmission and Reception (Amplitude Modulation) 3.Analog Signal Transmission and Reception (Amplitude Modulation) 4.Analog Signal Transmission and Reception (Angle Modulation) 5. Random Processes 6. Random Processes

7. Random Processes 8. Effect of noise on analog communication systems 9. Effect of noise on analog communication systems 10. Effect of noise on analog communication systems

Course Book:

- John G. Proakis and Masoud Salehi, Communication Systems Engineering, 2/E, Prentice Hall, International Edition, 2002.
- John G. Proakis, Masoud Salehi, and Gerhard Bauch Contemporary Communication Systems Using MATLAB, 3/E, Cengage Learning, 2013.

Supplementary Books/References:

- B. P. Lathi, Modern Digital and Analog Communication Systems, 3/E, Oxford University Press, 1998.
- Leon W. Couch, Digital and Analog Communication Systems, 7/E, Prentice Hall, 2007.

ELK 499 Mechatronics and Robotics (3+0+0) 3

This course covers the fundamental topics of mechatronics and robotics including modelling, analysis and design. The subjects taught are; basics of mechatronic systems, basics of mechanical systems, fundamentals of control systems, modelling and control of mechatronic systems, design of embedded systems (hardware and programming), sensors, transducers, actuators, robotics, industrial robots and application areas, case studies.

Course Book:

- W. Bolton, Mechatronics, 7th Ed., Pearson Education, 2018

Supplementary Books/References:

- R. Isermann, Mechatronic Systems: Fundamentals, Springer, 2005
- D. Shetty, R.A. Kolk, Mechatronic System Design, 2nd Ed., Cengage Learning, 2012
- A. Silva, Robotics and Mechatronics, Wilford Press, 2016.
- G., Onwubolu, Mechatronics: Principles and Applications, Elsevier, 2005.
- S.B. Niku, Introduction to Robotics, Wiley, 2020

MEEN 455 Introduction to Mechatronic Engineering (3+0+0) 3

This is an introductory course in mechanical engineering. The fundamental knowledge of mechatronics, elements of mechatronic systems and integration structure will be covered. Students deal with sensors, actuators and interface units in mechatronic systems

Supplementary Books/References:

- Introduction to mechatronics and measurement systems, David G. Alciatore, 5th Ed., McGraw-Hill Education.

- Mechatronics with experiments, Sabri Cetinkunt. – Second edition. Wiley, 2007.

MEEN 456 Mechatronic Design (3+0+0) 3

In this course, students will model a mechatronic system, design a controller and simulate the system by using Matlab/Simulink. Also, they will decide mechatronic elements of the design projects.

Supplementary Books/References:

- Mechatronic Systems, E-K. Boukas and F. M. AL-Sunni 2011 Springer-Verlag

MATE 491 Abstract Mathematics (3+0+0) 3

The content of this course is, think abstractly, prove mathematical facts and introduce the basic concepts of analysis and algebra.

Course Book:

- S. Akkaş, H.H. Hacısalihoğlu, Soyut Matematik, Gazi Üniversitesi press No:43, Ankara, 1984.
- A. Dönmez., Kümeler Kuramı ve Soyut Matematik, Atatürk University press No. 638, Erzurum, 1987.

Supplementary Books/References:

- F. Çallıalp, Soyut Matematik, İstanbul Technical Üniv. İstanbul, 1995.