NEAR EAST UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF MECHATRONICS ENGINEERING

Master of Science Degree

September, 2020

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1. FORMAL SPECIFICATIONS

Name of the program	Mechatronics Engineering Graduate (MSc.) Program
Language of instruction	English
Pre-requisite	Bachelor of Science (BSc) degree in Electrical-Electronics Engineering, Mechanical Engineering or Computer Engineering
Final degree	Master of Science (MSc) in Mechatronics Engineering
Standard period of study	Minimum of 4 semesters (Plus 1 year English Proficiency, if required)
Credit points	126 ECTS Credits 21 National Credits
Type of program	Full-Time
Website of the higher education institute	http://www.neu.edu.tr
Intake rhythm	Fall semester/Spring semester
Graduate School/Faculty/Department	Graduate School of Applied Sciences /Faculty of Engineering/Mechatronics Engineering Department
Official contact person for publication on the web	Assoc. Prof. Dr. Hüseyin HACI
E-mail	huseyin.haci@neu.edu.tr

2. CURRICULUM/CONTENT

The curriculum and detailed content of the degree program are given below. In order to be awarded a degree from MSc program with thesis, candidates are required to succeed in 7 modules, a seminar and thesis study. The modules are elective courses and the students choose them under the supervision of their supervisors according to their specialization area. These modules can be eligible MSc program courses from Electrical-Electronics Engineering, Mechanical Engineering and Computer Engineering departments.

First Year

First Year, Fall Semester (9/9 credits, 30/30 ECTS)				
Course Code	**Course Name**	**Credit**	**ECTS**	**Prerequisite**
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing

First Year, Spring Semester (9/18 credits, 30/60 ECTS)				
Course Code	**Course Name**	**Credit**	**ECTS**	**Prerequisite**
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing

Second Year

Second Year, Fall Semester (3/21 credits, 35/95 ECTS)				
Course Code	**Course Name**	**Credit**	**ECTS**	**Prerequisite**
EE/MEE/COM 5xx	Elective Course	3	10	Graduate Standing
MCT 500	Master's Thesis	-	25	-

Second Year, Spring Semester (0/21 credits, 56/126 ECTS)				
Course Code	**Course Name**	**Credit**	**ECTS**	**Prerequisite**
MCT 500	Master's Thesis	-	25	-
MCT 535	Master's Seminar	-	6	-

3. EE MODULES (MSc)

Area: Intelligent Systems and Control

EE 501/601 – Linear Systems Theory
EE 508/608 – Artificial Neural Networks
EE 511/611 – Artificial Intelligence
EE 515/615 – VLSI Design
EE 516/616 – Integrated Sensors and Sensing Systems
EE 517/617 – Process Control Instrumentation Technology
EE 518/618 – Optimal and Adaptive Control
EE 519/619 – Fuzzy Systems
EE 522/622 – Intelligent Control
EE 523/623 – Robotic Systems
EE 528/628 – Advanced Microprocessors
EE 530/630 – Mechatronics
EE 532/632 – Pattern Recognition
EE 540/640 – Expert Systems

Area: Communications, Signal Processing and Networking

EE 502/602 – Random Variables and Stochastic Processes
EE 503/603 – Advanced Digital Signal Processing
EE 504/604 – Wireless and Personal Communication Systems
EE 505/605 – Information Theory and Coding
EE 506/606 – Advanced Data Communications
EE 507/607 – Computer Networks and Internet
EE 509/609 – Speech Processing
EE 510/610 – Image Processing
EE 512/612 – Electromagnetic Wave Propagation
EE 514/614 – Radar Systems
EE 520/620 – Optimization
EE 521/621 – Estimation Theory
EE 529/629 – Data Communications and Networking
EE 538/638 – Telecommunication Networks

Area: Power Systems

EE 513/613 – Operation and Maintenance of Power Systems
EE 524/624 – Advanced Static Power Conversion
EE 525/625 – Theory and Design of Electrical Machines
EE 526/626 – Power Electronics
EE 527/627 – Advanced High Voltage Techniques
EE 531/631 – Flexible AC Transmission Systems
EE 533/633 – Electricity Outages and Load Management
EE 534/634 – Speed Control of Electric Motors
EE 536/636 – Power Electronic Applications
EE 541/641 – Advanced Symmetrical Components and Rotating Field Theory
EE 542/642 – Control and Simulation of Power Electronic Converters
EE 543/643 – Power Electronic Applications and Simulations
EE 544/644 – Advanced Alternative Energy Resources
EE 545/645 – Modelling and Design of Power Electronic Converters
EE 546/646 – Drive and System Application of Power Electronic Converters
EE 572/672 – High Voltage Insulation Coordination

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Advanced Digital Signal Processing
Course Unit Code	**EE 503**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Prof. Dr. FakhreddinMamedov
Name of Lecturer (s)	Prof. Dr. FakhreddinMamedov
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:

This course covers digital processing of the continuous time signals. Discrete Fourier transforms. Fast-Fourier transform. FIR and IIR filters design. Limit cycles. Adaptive filtering. Adaptive digital filters in communication. Adaptive line enhancement and equalization. Adaptive delta and differential pulse code modulations. Problems using Matlab.

Objectives of the Course:

- Study advanced Digital Processing of the continuous time signals.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	• have a better understanding of digital processing of signals.	1,2
2	• have a better understanding of FIR and IIR filters design.	1,2

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to apply mathematics, science, and engineering knowledge to understand electrical engineering related events	5
2	Ability to design and conduct experiments, and computer simulations, and be able to analyze data.	5
3	Ability to design electric and electronic devices and products.	1
4	Ability to work with multi-disciplinary engineering sciences.	2
5	Ability to identify and solve problems using technical literature for research tasks and system design.	4

6	Be able to understand professional, ethical responsibilities and standards of engineering practice.	4
7	Be able to understand the effect of engineering in a global, economic, environmental, and societal setting.	2
8	Be able to use engineering techniques, skills, and tools for practice and product development.	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Digital processing of the continuous time signals.	HW #1
2	Discrete Fourier transforms.	
3	Fast-Fourier transform.	
4	FIR and IIR filters design.	
5	Limit cycles.	
6	Adaptive filtering.	Midterm
7	Adaptive digital filters in communication.	
8	Adaptive line enhancement and equalization.	
9	Adaptive delta and differential pulse code modulations.	
10	Problems using Matlab.	Final

Recommended Sources

- Sanjit K. Mitra. Digital Signal Processing. A computer based approach. McGraw-Hill, 1998

Assessment

Assignments&Quizes	25%	Programming and Research
Midterm Exam	30%	Written Exam
Final Exam	45%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Students may use calculators during the exam.
3. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	15	3	45
Labs and Tutorials	-	-	-

Assignment	2	25	50
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	2	10	20
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			287
Total Workload/30(h)			9.56
ECTS Credit of the Course			10

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Wireless & Personal Communication Systems
Course Unit Code	**EE 504**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Prof. Dr. FakhreddinMamedov
Name of Lecturer (s)	Prof. Dr. FakhreddinMamedov
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:

This course covers Cellular communication concepts. Roaming. Cells splitting. Access technology. FDMA, TDMA and CDMA. Radio interface. Spread spectrum techniques. Up-link and down-link. Architecture of mobile switching center. Mobile and base stations call processing. Authentication. Encryption and information security. North American, Japanese and European cellular systems. Iridium-66 and globstar-48 systems. Laboratory experiments

Objectives of the Course:

- Study Cellular communication concepts.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	• have a better understanding of Cellular Communication systems.	1,2
2	• have a better understanding of Wireless Communication concept.	1,2

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to apply mathematics, science, and engineering knowledge to understand electrical engineering related events	5
2	Ability to design and conduct experiments, and computer simulations, and be able to analyze data.	5
3	Ability to design electric and electronic devices and products.	1
4	Ability to work with multi-disciplinary engineering sciences.	2
5	Ability to identify and solve problems using technical literature for research tasks and system design.	4
6	Be able to understand professional, ethical responsibilities and standards of	4

	engineering practice.	
7	Be able to understand the effect of engineering in a global, economic, environmental, and societal setting.	2
8	Be able to use engineering techniques, skills, and tools for practice and product development.	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Cellular communication concepts.	HW #1
2	Roaming.	
3	Cells splitting.	
4	Access technology. FDMA, TDMA and CDMA.	
5	Radio interface. Spread spectrum techniques. Up-link and down-link.	
6	Architecture of mobile switching center. Mobile and base stations call processing.	Midterm
7	Authentication. Encryption and information security.	
8	North American, Japanese and European cellular systems. Iridium-66 and globstar-48 systems.	Final

Recommended Sources

- Thedores S. Rapparot. Wireless Communication. Principle and Practice. Printice-Hall, NJ, 2000
- Carg V. K. & Wilkes J. E. Wireless and Personal Communication Systems. PrinticeHall, NJ, 1996
- Simon Haykin, Michael Moher. Modern Wireless Communications. Printice-Hall, NJ, 2003

Assessment

Assignments&Quizes	25%	Programming and Research
Midterm Exam	30%	Written Exam
Final Exam	45%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies.

Course Policies

4. Attendance to the course is mandatory.
5. Students may use calculators during the exam.
6. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations.

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)

Course duration in class (including Exam weeks)	15	3	45
Labs and Tutorials	-	-	-
Assignment	2	25	50
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	2	10	20
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			287
Total Workload/30(h)			9.56
ECTS Credit of the Course			10

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Information Theory and Coding
Course Unit Code	**EE 505**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assist.Prof.Dr. Ali Serener
Name of Lecturer (s)	Assist.Prof.Dr. Ali Serener
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:
This course covers intermediate to advanced information theory and channel coding topics. Topics covered include fundamentals of channel coding as well as powerful error-correcting codes such as low-density parity-check codes and turbo codes.

Objectives of the Course:
- Study advanced information theory and modern error-correcting codes

Learning Outcomes

After completing the course the student will be able to		Assessment
1	• have a better understanding of information sources	1,2
2	• have a better understanding of how channels are modeled.	1,2
3	• understand advanced error correcting codes and their applications.	1,2

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to apply mathematics, science, and engineering knowledge to understand electrical engineering related events	5
2	Ability to design and conduct experiments, and computer simulations, and be able to analyze data.	5
3	Ability to design electric and electronic devices and products.	1
4	Ability to work with multi-disciplinary engineering sciences.	2
5	Ability to identify and solve problems using technical literature for research tasks and system design.	4

6	Be able to understand professional, ethical responsibilities and standards of engineering practice.	4
7	Be able to understand the effect of engineering in a global, economic, environmental, and societal setting.	2
8	Be able to use engineering techniques, skills, and tools for practice and product development.	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Entropy and Information, 1.1-1.10	HW #1
2	Entropy and Information, 1.11-1.21	
3	Information Channels, 2.1-2.5	
4	Information Channels, 2.6-2.10	Quiz #1
5	Source Coding, 3.1-3.3	
6	Source Coding, 3.4-3.6	
7	Fundamentals of Channel Coding, 5.1-5.3	
8		Midterm
9	Fundamentals of Channel Coding, 5.4-5.7	HW #2
10	Error-Correcting Codes, 6.1-6.4	
11	Low Density Parity Check Codes, Lecture Notes	
12	Convolutional Codes, Lecture Notes	Quiz #2
13	Convolutional Codes, Lecture Notes	
14	Turbo Codes, Lecture Notes	
15		Final

Recommended Sources

- Fundamentals of Information Theory and Coding Design, R. Togneri and C. J.S. deSilva, CRC Press.

Assessment

Assignments&Quizes	25%	Programming and Research
Midterm Exam	30%	Written Exam
Final Exam	45%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

7. Attendance to the course is mandatory.
8. Students may use calculators during the exam.
9. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the

Near East University General Student Discipline Regulations			
ECTS allocated based on Student Workload			
Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	15	3	45
Labs and Tutorials	-	-	-
Assignment	2	25	50
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	2	10	20
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			287
Total Workload/30(h)			9.56
ECTS Credit of the Course			10

MSc Program, Electrical & Electronic Engineering Department

Course Unit Title	Artificial Neural Networks
Course Unit Code	**EE 508**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assist. Prof. Dr. KamilDimililer
Name of Lecturer (s)	Assist. Prof. Dr. KamilDimililer
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	Computer programming skills

Course description:

This course explores the organization of synaptic connectivity as the basis of neural computation and learning. Perceptrons and dynamical theories of recurrent networks including amplifiers, attractors, and hybrid computation are covered. Additional topics include backpropagation and Hebbian learning, as well as models of perception, motor control, memory, and neural development.

Objectives of the Course:

- To give the students an opportunity to study and learn some concepts of Artificial Neural Networks
- To gain an appreciation of the principal components of Computational Intelligence
- To evaluate and implement Neural Networks for solving synthetic and real-world problems

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Explain the principles underlying Neural Networks	1
2	Understand the theoretical foundation of Neural Networks	1
3	Apply Neural Networks to find solutions to complex problems	1
4	Analyze parameter choices in the use of Neural Networks	1
5	Summarize current research in Neural Networks	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	An ability to understand and apply extensive advanced knowledge of mathematic-scientific and engineering principles	3
2	An ability to analyse and solve problems scientifically	4
3	An ability to apply innovative computational methods to problem-solving	5

4	An ability to design and conduct advanced software projects	3
5	An ability to assess applicable methods and their limits	5
6	An ability to identify, find and procure necessary information	4
7	An ability to plan and carry out analytic, model and experimental investigations	4
8	An understanding of the role of engineers in society	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Introduction to Neural Networks	
2	Neural Computing	
3	Biological Neuron	
4	Definition of ANN	
5	Intelligent Computing	
6	Intelligent Computing	
7		Midterm
8	Traditional vs Neural Computing	
9	Hebbian Rule	
10	Classification on ANN	
11	Parameters of ANN	
12	XOR Problem	
13	Adaline Networks	
14	Recurrent Networks	
15	Hopfield Networks	
16		Final

Recommended Sources

- Simon Haykin, Neural Networks, 1994.
- Tom M. Mitchell, Machine Learning, 1997

Assessment

Assignments	30%	Research & Coding
Midterm Exam	30%	Written Exam
Final Exam	40%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

- Attendance to the course is mandatory.
- Students may use calculators during the exam.
- Cheating and plagiarism will not be tolerated. Cheating will be penalized according to

the Near East University General Student Discipline Regulations			
ECTS allocated based on Student Workload			
Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	3	20	60
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			296
Total Workload/30(h)			9.86
ECTS Credit of the Course			10

MSc Program, Electrical & Electronic Engineering Department

Course Unit Title	Advanced Image Processing
Course Unit Code	**EE 510**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assist.Prof.Dr. BoranŞekeroğlu
Name of Lecturer (s)	Assist.Prof.Dr. BoranŞekeroğlu
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	Computer programming skills

Course description:

Objectives of the Course:

- To give the students an opportunity to study and learn advanced concepts of Image Processing.
- To implement advanced image processing methods and algorithms to solve real-life problems.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Implement advance image processing techniques	2
2	Understand the theoretical aspects of image processing	1
3	Analyze and compare image processing methods	2
4	Summarize current researches in real life applications of Image Processing	2

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	An ability to understand and apply extensive advanced knowledge of mathematic-scientific and engineering principles	3
2	An ability to analyse and solve problems scientifically	5
3	An ability to apply innovative computational methods to problem-solving	5
4	An ability to design and conduct advanced software projects	2

5	An ability to assess applicable methods and their limits	4
6	An ability to identify, find and procure necessary information	5
7	An ability to plan and carry out analytic, model and experimental investigations	4
8	An understanding of the role of engineers in society	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Introduction to Image Processing	
2	Fundamentals of Digital Imaging	
3	Image Enhancement in Spatial Domain	
4	Image Enhancement in Spatial Domain	
5	Image Enhancement in Frequency Domain	
6	Image Enhancement in Frequency Domain	
7		Midterm
8	Morphological Image Processing	
9	Morphological Image Processing	
10	Image Segmentation	
11	Image Restoration	
12	Object Recognition	
13	Review	
14	Review	
15		
16		Final

Recommended Sources

- Gonzalez and Woods "Digital Image processing"
- Gonzalez, Woods "Digital Image processing using Matlab"

Assessment

Assignments	30%	Programming and Research
Midterm Exam	25%	Written Exam
Final Exam	45%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

- Attendance to the course is mandatory.
- Students may use calculators during the exam.

- Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	2	30	60
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			296
Total Workload/30(h)			9.86
ECTS Credit of the Course			10

MSc Program, Electrical & Electronic Engineering Department

Course Unit Title	Electromagnetic Wave Propagation
Course Unit Code	**EE 512**
Type of Course Unit	
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	
Semester when the course unit is delivered	
Course Coordinator	Assist.Prof. Dr. RefetRamiz
Name of Lecturer (s)	Assist.Prof. Dr. RefetRamiz
Name of Assistant (s)	-
Mode of Delivery	Face to Face,
Language of Instruction	English
Prerequisites	
Recommended Optional Programme Components	Mathematic skills

Course description:

Fundamental Concepts and Theorems; Maxwell Equations; Electromagnetic Waves;Classifications of Waves; Guided Waves;Ground wave propagation;-Plane-earth reflection,-Plane-earth reflection,-Space wave,-Surface wave,-Elevated dipole antenna above a plane earth,-Wave tilt of the surface wave,-Spherical earth propagation,-Tropospheric waves,Ionospheric Propagation;-The ionosphere,-Effective permittivity and conductivity of an ionised gas,-Reflection and refraction waves by the ionosphere,-Attenuation factor for ionospheric propagtion,-Sky-wave trnasmission calculations,-Effect of the earth's magnetic field,-Wave propoagtion in the ionosphere,

Objectives of the Course:

- To provide a student with the necessary tools for the critical evaluation of existing and future electromagnetic wave phenomena
- To teach the concepts and principles of constructions of electromagnetic waves
- To enable a student to evaluate and choose an electromagnetic tools to match the problem

Learning Outcomes

At the end of the course the student should be able to		Assessment
1	Use of evaluation criteria for an assessment of electromagnetic waves	1, 2
2	Demonstrate and reconstruct a specific electromagnetic wave problems	1, 2
3	Apply electromagnetic wave propagation principles for verification of the problems	1, 2
4	Analyze variables of electromagnetic waves problems	1, 2
5	Examine different concepts implemented in electromagnetic wave propagation	1, 2

	problems	
6	Compare electromagnetic waves and propagation problems	1, 2
7		

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	4
2	An ability to analyze a problem, identify and define the computing requirements appropriate to its solution	3
3	Ability to design a product within realistic constraints	3
4	Ability to work with multi-disciplinary teams	4
5	Planning and carrying out experiments, as well as to analyze and interpret data	3
6	Be able to understand professional and ethical responsibilities.	3
7	Be able to understand the effect of engineering in a global, economic, environmental, and social setting.	3
8	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Chapter	Topics	Exam
1		Fundamental Concepts and Theorems.	
2		Maxwell Equations	
3		Electromagnetic Waves Classifications of Waves. Guided Waves.	
4		Ground wave propagation. -Plane-earth reflection	
5		-Plane-earth reflection	
6		-Space wave -Surface wave	
7			Midterm
8		-Elevated dipole antenna above a plane earth -Wave tilt of the surface wave	
9		-Spherical earth propoagtion -Tropospheric waves	
10		Ionospheric Propagation -The ionosphere	
11		-Effective permittivity and conductivity of an ionised gas	
12		-Reflection and refraction waves by the ionosphere	
13		-Attenuation factor for ionospheric propagtion -Sky-wave trnasmission calculations	
14		-Effect of the earth's magnetic field -Wave propagation in the ionosphere	
15			Final

Recommended Sources
Textbook:
Supplementary Course Material

- EdwardC. Jordan, Keith G. Balmain, ELECTROMAGNETIC WAVE AND RADIATING SYSTEMS.

Assessment

Attendance	10 %	
Assignment/Project	15 %	
Midterm Exam	35 %	Written Exam
Final Exam	40 %	Written Exam
Total	100 %	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

- Attendance to the course is mandatory.
- Late assignments will not be accepted unless an agreement is reached with the lecturer.
- Students may use calculators during the exam.
- Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	15	3	45
Labs and Tutorials	-	-	-
Assignment	5	12	60
Project/Presentation/Report	1	10	10
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	35	35
Self Study	14	8	112
Total Workload			292
Total Workload/30(h)			9.73
ECTS Credit of the Course			10

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Advanced Static Power Conversion
Course Unit Code	**EE 524**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assoc. Prof. Dr. ÖzgürCemalÖzerdem
Name of Lecturer (s)	Assoc. Prof. Dr. ÖzgürCemalÖzerdem
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	-

Course description:

Overloaded modes of operation of rectifiers, characteristics. Reactive power and harmonics in ac-dc converters, cascade use of converters. Commutation techniques in inverters; McMurray circuit and its modified forms. Voltage control and harmonic elimination. ASCII inverters. Chopper structures. Improving the performance and optimization of circuit elements.

Objectives of the Course:

- To give the students an opportunity to study and learn some concepts of Static Power Conversion
- To gain an appreciation of the principal components of Converters and Inverters
- To evaluate and implement Voltage Control and Harmonic elimination

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Explain the principles underlying Static Power Conversion	1
2	Understand the theoretical foundation of Reactive power	1
3	Apply Power Conversion to find solutions to complex problems	1
4	Analyze parameter choices in the use of converters and inverters	1
5	Summarize current research in Static Power Conversion	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	An ability to understand and apply extensive advanced knowledge of mathematic-scientific and engineering principles	3

2	An ability to analyse and solve problems scientifically	4
3	An ability to apply innovative computational methods to problem-solving	5
4	An ability to design and conduct advanced software projects	3
5	An ability to assess applicable methods and their limits	5
6	An ability to identify, find and procure necessary information	4
7	An ability to plan and carry out analytic, model and experimental investigations	4
8	An understanding of the role of engineers in society	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Overloaded modes of operation of rectifiers	
2	Overloaded modes of operation of rectifiers	
3	Reactive power and harmonics in ac-dc converters	
4	cascade use of converters	
5	cascade use of converters	
6	Commutation techniques in inverters	
7		Midterm
8	Analysis methods	
9	McMurray circuit and its modified forms	
10	Voltage control and harmonic elimination	
11	ASCII inverters	
12	Chopper structures	
13	Improving the performance and optimization of circuit elements.	
14	Applications	
15	Applications	
16		Final

Recommended Sources

- Various research papers from literature

Assessment

Presentation	15%	Project Presentation
Project	10%	
Midterm Exam	35%	Written Exam
Final Exam	40%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Students may use calculators during the exam.
3. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	2	35	70
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			306
Total Workload/30(h)			10.02
ECTS Credit of the Course			10

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Power Electronics
Course Unit Code	**EE 526**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assoc. Prof. Dr. ÖzgürCemalÖzerdem
Name of Lecturer (s)	Assoc. Prof. Dr. ÖzgürCemalÖzerdem
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	-

Course description:

Advanced power electronic converters, techniques for modeling switching circuits, resonant and multi-level converters, Pulse-Width-Modulation (PWM) techniques, soft switching methods, low-voltage high-current design, Multi-phase, controlled and uncontrolled rectifiers and inverters with various operating techniques and their design and control, Includes extensive computer-aided circuit simulation and power supply control.

Objectives of the Course:

- To give the students an opportunity to study and learn some concepts of Power Electronics
- To gain an appreciation of the principal components of Modulation Techniques
- To evaluate and implement Rectifiers and Inverters with various operation techniques.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Explain the principles underlying Power Electronics	1
2	Understand the theoretical foundation of switching circuits	1
3	Apply Power Electronics to find solutions to complex problems	1
4	Analyze parameter choices in the use of rectifiers and inverters	1
5	Summarize current research in Power Electronics	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	An ability to understand and apply extensive advanced knowledge of	3

	mathematic-scientific and engineering principles	
2	An ability to analyse and solve problems scientifically	4
3	An ability to apply innovative computational methods to problem-solving	5
4	An ability to design and conduct advanced software projects	3
5	An ability to assess applicable methods and their limits	5
6	An ability to identify, find and procure necessary information	4
7	An ability to plan and carry out analytic, model and experimental investigations	4
8	An understanding of the role of engineers in society	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Advanced power electronic converters	
2	techniques for modeling switching circuits	
3	resonant and multi-level converters	
4	Pulse-Width-Modulation (PWM) techniques	
5	soft switching methods	
6	low-voltage high-current design	
7		Midterm
8	Multi-phase, controlled and uncontrolled rectifiers	
9	inverters with various operating techniques and their design and control	
10	computer-aided circuit simulation and power supply control.	
11	Problem solving techniques	
12	Applications	
13	Applications	
14	Presentations	
15	Presentations	
16		Final

Recommended Sources

1. Mohan, Undeland, Robins, 'Power Electronics Converter Applications and Design', Third Edition, John Wiley and Sons, 2003
2. M. H. Rashid, 'Power Electronics Circuits Devices and Applications' Third Edition, 2004, Prentice Hall.
3. B. K.Bose, 'Modern Power Electronics and AC drives' Prentice Hall International, 2002
4. L. Gyugi, 'Power Transmission Control', IEE power and Energy Series 30

Assessment

Presentation	15%	Project Presentation
Project	10%	
Midterm Exam	35%	Written Exam

Final Exam	40%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

4. Attendance to the course is mandatory.
5. Students may use calculators during the exam.
6. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	2	35	70
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			306
Total Workload/30(h)			10.02
ECTS Credit of the Course			10

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Flexible AC Transmission Systems
Course Unit Code	**EE 531**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assoc. Prof. Dr. ÖzgürCemalÖzerdem
Name of Lecturer (s)	Assoc. Prof. Dr. ÖzgürCemalÖzerdem
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	-

Course description:

Flow of power in AC systems.Transmission problems and the emergence of FACTS. FACTS controllers; definitions and description of basic controllers.Objectives of shunt compensation. Methods of controllable Var Generation. Static Var Compensators; SVC and STATCOM. Comparison between STATCOM and SVC.Objectives of series compensation. Variable impedance and Switching converter type series compensators; GCSC, TCSC, TSSC, SSSC. Unified Power Flow controllers (UPFC), Interline Power Flow Controllers (IPFC) Application of power electronics equipment for power system performance enhancement. Modellingof FACTS equipment. Application examples

Objectives of the Course:

- To give the students an opportunity to study and learn some concepts of FACTS Systems
- To gain an appreciation of the principal components of Power Quality improvement
- To evaluate and use Power flow Controllers.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Explain the principles underlying FACTS	1
2	Understand the theoretical foundation of power flow in AC Transmission Systems	1
3	Apply FACTS Controllers to find solutions to complex problems	1
4	Analyze parameter choices in the use of FACTS Equipments	1
5	Summarize current research in FACTS	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	An ability to understand and apply extensive advanced knowledge of mathematic-scientific and engineering principles	3
2	An ability to analyse and solve problems scientifically	4
3	An ability to apply innovative computational methods to problem-solving	5
4	An ability to design and conduct advanced software projects	3
5	An ability to assess applicable methods and their limits	5
6	An ability to identify, find and procure necessary information	4
7	An ability to plan and carry out analytic, model and experimental investigations	4
8	An understanding of the role of engineers in society	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Flow of power in AC systems	
2	Transmission problems and the emergence of FACTS. FACTS controllers; definitions and description of basic controllers	
3	Objectives of shunt compensation.	
4	Methods of controllable Var Generation. Static Var Compensators; SVC and STATCOM.	
5	Comparison between STATCOM and SVC	
6	Objectives of series compensation	
7		Midterm
8	Variable impedance and Switching converter type series compensators; GCSC, TCSC,	
9	Variable impedance and Switching converter type series compensators TSSC, SSSC	
10	Interline Power Flow Controllers(IPFC)	
11	Problem solving techniques	
12	Application of power electronics equipment for power system performance enhancement	
13	The natural and forced response of the second-order circuits.	
14	Modelling of FACTS equipment	
15	Application examples.	
16		Final

Recommended Sources

1. Understanding FACTS: Concepts and Technology of Flexible AC Transmssion Systems Narain G. Hingorani, Laszio Gyugyi, IEEE Press (IEEE Power Engineering Society Sponsored) ISBN:0-7803-3455-8

2.Flexible AC Transmision Systems (FACTS), Edited By: Yong Hua Song and Allan T. Johns, Published by IEE ISBN: 0-85296-771-3

3.IEEE Power Engineering Series-6

Assessment

Presentation	15%	Project Presentation
Project	10%	

Midterm Exam	35%	Written Exam
Final Exam	40%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

7. Attendance to the course is mandatory.
8. Students may use calculators during the exam.
9. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	2	35	70
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			306
Total Workload/30(h)			10.02
ECTS Credit of the Course			10

MSc Program, Electrical & Electronic Engineering Department

Course Unit Title	Pattern Recognition
Course Unit Code	**EE 532**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assist. Prof. Dr. KamilDimililer
Name of Lecturer (s)	Assist. Prof. Dr. KamilDimililer
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	Computer programming skills

Course description:

This class deals with the fundamentals of characterizing and recognizing patterns and features of interest in numerical data. We discuss the basic tools and theory for signal understanding problems with applications to user modeling, affect recognition, speech recognition and understanding, computer vision, physiological analysis, and more. We also cover decision theory, statistical classification, maximum likelihood and Bayesian estimation, nonparametric methods, unsupervised learning and clustering. Additional topics on machine and human learning from active research are also talked about in the class.

Objectives of the Course:

- To give the students an opportunity to study and learn some concepts of Pattern Recognition
- To gain an appreciation of the principal components of Intelligent Systems
- To evaluate and implement Pattern Recognition System for solving synthetic and real-world problems

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Explain the principles underlying Pattern Recognition	1
2	Understand the theoretical foundation of Pattern Recognition	1
3	Apply Pattern Recognition to find solutions to complex problems	1
4	Analyze parameter choices in the use of Pattern Recognition	1
5	Summarize current research in Pattern Recognition	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	An ability to understand and apply extensive advanced knowledge of mathematic-scientific and engineering principles	3
2	An ability to analyse and solve problems scientifically	4
3	An ability to apply innovative computational methods to problem-solving	5
4	An ability to design and conduct advanced software projects	3
5	An ability to assess applicable methods and their limits	5
6	An ability to identify, find and procure necessary information	4
7	An ability to plan and carry out analytic, model and experimental investigations	4
8	An understanding of the role of engineers in society	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Introduction to Pattern Recognition	
2	Probability Distributions	
3	Linear Models for Regression	
4	Linear Models for Classification	
5	Neural Networks and Intelligent Computing	
6	Speech Recognition	
7		Midterm
8	Kernel Methods	
9	Machine and Human Learning	
10	Review	
11	Supervised and Unsupervised Learning	
12	Graphical Models	
13	Review	
14	Combining Models	
15	Review	
16		Final

Recommended Sources

- Pattern Classification, Richard Duda, Peter Hart, David G. Stork, 2000
- Pattern Recognition and Machine Learning (Information Science and Statistics), Christopher M. Bishop, 2007
- The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition Trevor Hastie, 2013

Assessment

Project/Presentation/Report	30%	Less than 25% class attendance results in NA grade
Midterm Exam	30%	Written Exam
Final Exam	40%	Written Exam

Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

- Attendance to the course is mandatory.
- Students may use calculators during the exam.
- Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	2	30	60
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			296
Total Workload/30(h)			9.86
ECTS Credit of the Course			10

MSc program, Electrical & Electronic Engineering Department

Course Unit Title	Telecommunication Networks
Course Unit Code	**EE 538**
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-

Semester when the course unit is delivered	-
Course Coordinator	Assist.Prof.Dr. Ali Serener
Name of Lecturer (s)	Assist.Prof.Dr. Ali Serener
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:
Proper design and operation of efficient communication networks is becoming more important as the digital telecommunication services of today are constantly growing. This course provides an introduction to communication networks. Specific topics to be covered include layered network architectures, error recovery and retransmission (ARQ), medium access control, routing and addressing, resource allocation and quality of service (QoS).

Objectives of the Course:

- Study the theory behind advanced communication networks

Learning Outcomes

After completing the course the student will be able to		Assessment
1	• have a better understanding of communication networks	1
2	• have a better understanding of network architectures	1
3	• understand medium access control, routing and addressing, resource allocation and quality of service (QoS)	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to apply mathematics, science, and engineering knowledge to understand electrical engineering related events	5
2	Ability to design and conduct experiments, and computer simulations, and be able to analyze data.	5
3	Ability to design electric and electronic devices and products.	1
4	Ability to work with multi-disciplinary engineering sciences.	2
5	Ability to identify and solve problems using technical literature for research tasks and system design.	5
6	Be able to understand professional, ethical responsibilities and standards of engineering practice.	3
7	Be able to understand the effect of engineering in a global, economic, environmental, and societal setting.	1
8	Be able to use engineering techniques, skills, and tools for practice and product development.	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Overview of Telecommunication Networks and Services	
2	Layered Architectures	

3	Layered Architectures	
4	Circuit Switching Networks	
5	Circuit Switching Networks	
6	Peer-to-Peer Protocols and Data Link Layer	
7	Peer-to-Peer Protocols and Data Link Layer	
8		Midterm
9	Medium Access Control Protocols and Local Area Networks	
10	Medium Access Control Protocols and Local Area Networks	
11	Packet-Switching Networks	
12	Packet-Switching Networks	
13	TCP/IP and ATM Networks	
14	TCP/IP and ATM Networks	
15		Final

Recommended Sources

- Communication Networks, A. Leon-Garcia, I. Widjaja, McGraw-Hill.
- Data Communication and Networking, B. A. Forouzan,McGraw-Hill.

Assessment

Laboratory&Quizes	20%	
Midterm Exam	35%	Written Exam
Final Exam	45%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Students may use calculators during the exam.
3. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	4	10	40
Assignment	-	-	-
Project/Presentation/Report	-	-	-

E-learning activities	-	-	-
Quizzes	1	10	10
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			286
Total Workload/30(h)			9.53
ECTS Credit of the Course			10

4. MEE MODULES (MSc)

MSc program, Mechanical Engineering Department

MEE501 Advanced and Applied Mathematics for Engineers (*3 credits*)

Review of Vector Algebra, Complex Numbers, Laplace Transforms and Fourier Series. Review of Ordinary Differential Equations. Variations of Parameters and Cauchy-Euler Differential Equations. Beta and Gamma Functions. System of Linear Diffrerential Equations. Partial Differential Equations and Probability.

MEE502 Advanced Numerical Methods (*3 credits*)

Nonlinear algebraic equations, sets of linear algebraic equations, eigenvalue problems, interpolation, curve fitting, ordinary differential equations, and partial differential equations, solution of partial differential equations of the parabolic, elliptic and hyperbolic type. Applications include fluid mechanics, gas dynamics, heat and mass transfer, thermodynamics, vibrations, automatic control systems, kinematics, and design.

GCC603Scientific Research Methods and Ethics (*3 credits*)

The course defines the understanding of science and engineering and describes the links between the interrelated technical subjects. Further, it considers the methods of scientific research and focuses on the five methods most widely used for natural sciences and engineering, giving much emphasis on experimental and field studies research methods. It also stresses the importance of integrated research methods. It stresses the important aspects of writing research proposal, presenting and report (thesis) writing. Finally it provides some information on research ethics and on controversies in research.

MEE511 Advanced Mechanical Behavior of Materials(*3 credits*)

Yielding and fracture under combined stress, Fracture of cracked members, Stress based fatigue for materials and notched members, Crack growth, Plastic deformation and models, plastic stress-strain analysis. Strain based approach to fatigue. Time dependent behavior

MEE515 Introduction to Implant Materials (*3 credits*)

Relationship between materials and medical science. Classification of implant materials in Orthopedy and Dentistry. Mechanical, Phyisical and Chemical properties of implant materials, biocompatibility, degradation of implant materials in biological environment, new products and standards.

MEE526 Introduction to Finite Element Method (*3 credits*)
Analysis of stress and strain. Constitutive equations. Plane problems of elasticity. The finite element concept. One-and two-dimensional finite element formulation techniques. Transformations, assembly and solution techniques. Introduction to three dimensional finite elements. Project assignments of one and two dimensional problems

MEE531 Advanced Fluid Mechanics (*3 credits*)

Governing Equations,Basic Conservation Laws, Flow Kinematics, Special Foems of the Governing Equations, Ideal-Fluid Flow:Two-dimensional Potential Flows, Viscous Flows ofIncompressible Fluids*:* Exact Solutions.

MEE532 Boundary Layer Theory (*3 credits*)

Some Features of Viscous Flow, Fundamentals of Boundary-Layer Theory, Field Equations for Flows of Newtonian Fluids, Laminar Boundary Layer: Boundary layer Equations in Plane Flow, Exact Solutions of the Boundary Layer Equations for Plane flows.Unsteady Boundary Layers. Laminar-Turbulent Transition, Turbulent Boundary Layer.

MEE533 Turbulent Flow(*3 credits*)

Stability Theory and Transition, Reynolds equation, Physical Structure of Turbulent Boundary Layer, Turbulent Pipe and Channel Flow, Analysis of Flat Plate, Integral Analysis, Jets, Wakes, Free-Shear layers, Turbulence Modelling, Isotropic Turbulence, Energy Spectra, Correlations.

MEE534 Computational Fluid Flow and Heat Transfer(*3 credits*)

Differential Equations, Types of Differential Equations, Boundary and Initial Conditions, Momentum, Energy, ans Species, General Form of the Conservation Equation; Review of Approximate Methods, Finite Difference, Weighted Residual, Spectral Method, Finite Element, Control Volume, Finite Analytical Method, Control Volume Formulation; Steady and Unsteady Diffusion Equation, Time Discretization Techniques, Explicit, Crank-Nicolson, Implicit Schemes; Solution of Algebraic Equations; Convection-Diffusion Equation, Upwind, Central and Quadratic Schemes, False Diffusion; Vorticity and Permittive Approach, Staggered Grid Concept, SIMPLE and Other Version of SIMPLE (SIMPLER) Algorithm; Applications, Examples of Heat Transfer, Laminar, Turbulent Flow.

MEE554 Heat Treatment of Metals(*3 credits*)

Phase transformations in solids. Modification of materials properties via Heat treatment↔Structure↔Property route. Spectrum of heat treatment, standards and equipment utilized. Fe-C phase diagram. Austenite transformation, TTT diagram and CCT curves. Hardenability, quenching and tempering of steel. Case hardening. Precipitation hardening. Heat treatment of non-ferrous metals.

MEE 565 Advanced Heat Transfer (*3 credits*)

The principles of heat transfer as applied to the analysis of engineering oriented problems are presented. The concepts of thermodynamic energy balances are used in various analytical developments and familiarity with fluid mechanics is certainly essential for the discussion of convective heat transfer section. Presentation of the material follows classical line of separate discussion for conduction, convection, and radiation and with applications where heat transfer in two or more modes might be significant. The log-mean-temperature difference and effectiveness approaches are discussed in heat-exchanger analysis since both are in wide use and each offers its own advantages to the designer.

MEE567 Advanced Conduction(*3 credits*)

Derivation of heat conduction equation in rectangular, cylindrical and spherical coordinate systems, and solution methods of this differential equation for steady and transient cases under various boundary conditions.

MEE568 Advanced Convection(*3 credits*)

Derivation of mass, momentum and energy conservation equations in rectangular and cylindrical coordinate systems. Boundary layer theory, solution of conservation equations and application in various problems.

MEE571 Mechanical Behavior of Composite Materials(*3 credits*)

Introduction to composite materials, Review of linear elasticity theory, Generalized Hooke's Law for anisotropic elastic materials, Macro- and micro- mechanical behavior of a lamina, Macromechanical behavior of a laminate, Bending, buckling and vibration of laminated plates.

MEE573 Fracture Mechanics (*3 credits*)

Analysis concepts for determining stress intensity factors for various types of cracks. Advanced experimental methods for evaluation of materials or structures for fracture toughness, analysis of moving cracks and the statistical analysis of fracture strength are topics

covered during this course. Finally, illustrative fracture control plans are treated to show the engineering applications of fracture mechanics.

MEE574 Theory of Elasticity(*3 credits*)

Definitions of stress and strain, stress-strain relations and tensors. Equilibrium equations, displacements and small strains, compatibility, and strain energy; formulation of the governing equations and the appropriate boundary conditions in linear elasticity, and uniqueness of the solutions; two-dimensional theory; stress functions; solutions in Cartesian and polar coordinates; and Fourier series. Elastic contact. Thick walled cylinders and disks. Beams on elastic foundation.

MEE575 Materials Failure Investigation(*3 credits*)

Relationship between the structure, charateristics, performance and failure in engineering materials. Material defects during production and in use. Crack propagation, fatigue, creep, radiation failure, wear, oxidation and corrosion. Examples. Failure prevention and measures.

MEE576 Semi-Solid Forming(*3 credits*)

Relationship between the structure, charateristics and process in engineering materials. Core knowledge on materials which are used in high performance products and industrial processes, microstructure and characteristics of semi-solids, alloys with wide freezing range, squeeze casting and semi-solid production technigues. Quality of products.

MEE577 Material Selections(*3 credits*)

A brief review of engineering materials. Details of Ashby materials selection charts. Materials selection procedure. Problems with multiple objectives and constraints. Influence of shape. Case studies. Student presentations.

MEE 680 Experimental Design and Analysis (*3 credits*)

Design andexperimentalanalysis: Prenciples of experimenatldesign, Statistical techniques, Factorialdesign, Fractionalfactorialdesign, Taguchi method and Variance analysis, Response surface methodology and variance analysis. Regresion analysis. Engineering applications.

MEE581 Advanced Stress Analysis (*3 credits*)

Studies of stresses and strains in three-dimensional problems, failure theories and yield criteria, stress function approach to two-dimensional problems, bending of non homogeneous

asymmetric curved beams, torsion of bars with noncircular cross sections, energy methods, elastic stability, introduction to plates.

MEE582 Advanced Mechanics of Solids (*3 credits*)

Continuum mechanics of solids and its application to the mechanical response of machine and structural elements, elasticity, plasticity and fracture criteria, elastic stress and analysis in torsion, plane stress and plane strain, stress concentrations, fracture mechanics, principle of virtual work and variational theorems, finite element method theorems of plastic limit analysis.

MEE 592 Energy Engineering (*3 credits*)

Economical and environmental analyses of energy conversion systems. Thermal power plants with steam, gas and steam-gas cycles. Cycle analysis, synthesis and optimization of thermal power plant design. Fossil fuels, combustion and steam production systems. Efficiency, cost and emission analysis.Nuclear reactions and nuclear power plants.

5. COM MODULES (MSc)

MSc program, Computer Engineering Department

COM502 – Expert Systems (3-0) 3
The evaluation of artificial intelligence systems. Decision making. Expert System (ES) characteristics. Architecture of ES. Hybrid ES. Knowledge representation in ES. Representation of knowledge by Object-attribute value triplets, Semantic networks, Frames, Logic programming, Neural networks, Production rules. Inference engine, forward and backward chaining mechanisms. Knowledge acquisition. Uncertainty, fuzzy ES. ES shells. Application of ES for solving different problems.

COM 503 – Fuzzy Systems (3-0) 3
Fuzzy Sets. Mathematical Background of Fuzzy Systems. Representation of Fuzzy Sets. Properties of Fuzzy Sets. Fuzzy Relations and Functions. Fuzzy Arithmetic. Fuzzy Modelling. Decision Making in Fuzzy Conditions. Fuzzy Control Systems. Design Examples. Computer Simulations of Fuzzy Systems. Problems Using C++ and Matlab.

COM 505 – Statistical Methods (3-0)3
Descriptive Statistics. Estimation. Inferences on Population Means. Inferences on Population Proportions. Simple Regression and Correlation. Multiple Linear Regression. Analysis of Variance. Design and Analysis of Multifactor Experiments. Statistical Quality Control.

COM 507 – Artificial Neural Networks (3-0) 3
Artificial Intelligence Computing. Expert systems. Neural networks. Biological background. Character recognition. Classification of neural networks. Supervised learning. Unsupervised learning. Neural simulation of logic gates. The Perceptron. Back propagation algorithm. Mathematical foundation for implementing Backpropagation algorithm. Hamming algorithm. Hopfield algorithm. Kohonen's algorithm. Adaline. Delta rule. Error minimization. The XOR problem.

COM 508 – Advanced Image Processing (3-0) 3
Image Modelling. Two-Dimensional Signal Analysis. Image Processing Techniques. Image Enhancement. Image Compression. Image Manipulation. Image Recognition. Region Extractions and Edge Detections. Problems Using C and Matlab. Laboratory Experiments.

COM 509 – Parallel Computing (3-0)3
This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. System resources are scaled by the number of processor used, the memory capacity enlarged,

the access latency tolerated, the I/O bandwidth required, the performance level desired, etc. The course includes: Processors and memory Hierarchy- Bus, Cache, and Shared Memory – Pipelining and Superscalar Techniques – Instruction Pipeline Design.

COM 514 – Genetic Algorithms (3-0) 3

Genetic algorithms based on principles from evolution theory are powerful and broadly applicable stochastic search and optimization techniques. Genetic algorithms belong to the larger class of evolutionary algorithms (EA), which generate solutions to optimization problems using techniques inspired by natural evolution, such as inheritance, mutation, selection, and crossover. The course is tended to introduce the central aspects of genetic algorithms and their applications to difficult-to-solve optimization problems in engineering and systems design.

COM 515 Design and Analysis of Algorithms (3-0)3

Algorithm design techniques, The computational complexity of algorithms. Approaches for designing algorithms: Divide-and-Conquer, Greedy Approach, Dynamic Programming, Amortized analysis. Lower and upper bound theory, Dynamic Programming, Backtracking and Branch-and-Bound. NP-Complete and NP-Hard problems. Approximation algorithms.

COM519 – Softcomputing (3-0) 3

Elements of Softcomputing. Hybrid intellectual systems. Fuzzy logic, fuzzy and linguistic modeling. Neural systems, neural modeling. Genetic algorithms, gentic operators. Chaos theory. Fuzzy neural networks and their learning. Neuro-genetic systems. Fuzzy-genetic systems. Neuro-fuzzy-genetic systems. Modelling and application of Softcomputing elements for solving different engineering problems.

COM520 – Pattern Recognition (3-0) 3

An introduction to the pattern recognition. Statistical Pattern Classification: Decision Theoretic approach, Template Matching, Feature Analysis, Linear and Nonlinear Decision surface approach. Decision boundaries, classifiers, and discriminant functions. Probabilistic Approach: Bayes Decision Theory. Syntactic Pattern Classification: Parsing, Pattern Grammar Analysis and Representation, Language analogy grammar and Picture description grammar. Estimation of parameters. Clustering. Classification algorithms, Feature selection. Neural networks recognizers. Neural Networks for Intelligent Pattern Recognition. Assignments will be given to design an Pattern Recognition System using C-language or MATLAB.

COM 521 – Numerical Analysis (3-0) 3

Difference equations. Numerical solution of initial value problems in ordinary differential equations and stability of methods. Numerical solution of linear, non-linear boundary value

problems in ordinary differential equations. Numerical Solution of parabolic, hyperbolic and elliptic partial differential equations. Selected algorithms will be performed for solution on computer.

COM522 Cryptography and Network Security (3-0) 3
Cryptographic algorithms. Public key encryption, differential and linear cryptanalysis, the Advanced Encryption Standard, Cryptographic hash functions, authentication protocols, key distribution protocols, key management, security protocol pitfalls, Internet cryptography, IP sec., SSL/TLS, e-mail security, firewalls.

COM 524 Scientific Research Methods (3-0) 3
A brief introduction to characteristics, types and scheduling of research. Research planning and design. Methodologies of research design. Measurement, data analysis. Presenting the results of research.

COM 525 Nonlinear Programming (3-0) 3
Optimization Models Linear Programming . Feasibility and Optimality. Duality and Sensitivity . Representation of Constraints. The Simplex Method . Network Problems. Unconstrained Optimization. Newton's Method. Methods for Unconstrained Optimization. Nonlinear Least-Squares Data Fitting. Optimality Conditions for Constrained Problems. The Lagrange Multipliers and the Lagrangian Function. Optimality Conditions for Nonlinear Constraints . Feasible-Point Methods. Sequential Quadratic Programming. Reduced-Gradient Methods. Penalty and Barrier Methods. Interior-Point Methods for Linear and Convex Programming

COM 528 – Advanced Microprocessor (3-0) 3
Introduction to microprocessors, 8-bit microprocessor architecture, 8085 and Z80 instruction sets, microprocessor programming examples,16-bit microprocessor architecture, 8086 instruction set, programming examples, microprocessor interfacing techniques, memory, input-output, and interrupts.

COM 534 Advanced Microcontroller Programming (3-0) 3
Microcontrollers versus microprocessors, microcontroller architectures, types of microcontrollers, microcontroller system development cycle, basic microcontroller programming in C, microcontroller interface programming, microcontroller interrupt handling mechanisms, using external interrupts, using timer interrupts, microcontroller C programming in real-time, advanced real-time programming for parallel and serial input-output, microcontroller busses, microcontroller system design examples using C.

COM 536 – Machine Vision (3-0) 3
Image, its properties, analysis, preprocessing. Regions and Edges. Curves and surfaces. Shape representation. Dynamic vision. Object recognition, Image understanding. 3D vision. Geometry and radiometry of 3D vision. 3D model based vision. Mathematical morphology of machine vision. Texture description and recognition. Motion analysis. Optical flow in motion analysis. Problems Using C and Matlab. Laboratory Experiments.

COM541 – Advanced Software Engineering (3-0) 3
This course is designed to present students with an overview of advanced topics in Software Engineering. The course will describe modern methods of software development, process models, assessment methodologies and tools. Different concepts in software engineering covering an overview of topics in software life cycle, project planning, software management, requirements capture and analysis, human factors, functional specification, software architecture, design methods, programming for reliability and maintainability, testing methods, configuration management, system delivery and maintenance, process and product evaluation and improvement and project documentation. Approaches for software development, namely the structured paradigm and the object-oriented paradigm, will be discussed. Software process, software life-cycle models and phases using objected-oriented approaches will be emphasized.

COM555 – Theory of Computation (3-0) 3
Introduction to theory of computation, automata theory, computability theory and complexity theory. Mathematical notions, terminology and definitions. Definition and examples of finite automata, designing finite automata and regular expressions.Turing machines, Church-Turing thesis, decidability and reducibility. Complexity theory: Classes P, NP and NP-Completeness.

COM556 – Semantic Web technologies (3-0) 3
In this course students will be introduced to the Semantic Web vision, as well as, the languages and tools useful in Semantic Web programming. They will understand how this technology revolutionizes the World Wide Web and its uses. Ontology languages (RDF, RDF-S and OWL) and technologies (explicit metadata, ontologies, logic, and inference) will be covered. In addition, students will be exposed to; ontology engineering, application scenarios, Semantic Web Query Languages, Description Logic and state of the art Semantic Web applications, such as linked data development. Student will also learn how to develop semantic applications with Java and Jena APIs.

6. MASTER'S SEMINAR

Course Unit Title	Master's Seminar
Course Unit Code	**MCT 535**
Type of Course Unit	Compulsory
Level of Course Unit	MSc program
National Credits	-
Number of ECTS Credits Allocated	6
Theoretical (hour/week)	-
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	2
Semester when the course unit is delivered	4
Course Coordinator	Assoc. Prof. Dr. Huseyin HACI
Name of Lecturer (s)	-
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:
Each master's student is required to present his/her research findings to students and instructors.

Objectives of the Course:
Conducting a scientific study in a field of Electrical and Electronic Engineering, and presenting this according to the scientific standards.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	Carry out an independent study requiring expertise in Electrical and Electronic Engineering	3,4
2	Present current developments and research work to other students and instructors, supporting this work with qualitative and quantitative data.	3,4

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to apply fundamental knowledge of science and Electrical Engineering.	5
2	Ability to identify, formulate and solve complex electrical engineering problems.	5
3	Ability to design and conduct experiments related to Electrical Engineering, as well as to analyse and interpret data.	5
4	Be able to design a complex system, component, or process to meet desired needs within realistic constraints.	4
5	Be able to develop solutions that meet the desired needs within the economic, manufacturing and sustainability borders.	2
6	Be able to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice and research.	5
7	Be able to function and communicate effectively in multidisciplinary teams.	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1-32	Conducting research	

Recommended Sources
Books, articles and other scientific documents related to the field

Assessment
Research presentation 100%

Assessment Criteria
Final grades are determined according to the Near East University Academic Regulations for Graduate Education

Course Policies
Governed by Graduate Education Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	-	-	-
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	1	0.5	0.5
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	-	-	-
Final Examination	-	-	-
Self-Study	32	5	160
Total Workload			160.5
Total Workload/30(h)			5.35
ECTS Credit of the Course			6

7. MASTER'S THESIS

Course Unit Title	Master's Thesis
Course Unit Code	**MCT 500**
Type of Course Unit	Compulsory
Level of Course Unit	MSc program
National Credits	-
Number of ECTS Credits Allocated	50
Theoretical (hour/week)	Varies
Practice (hour/week)	Varies
Laboratory (hour/week)	Varies
Year of Study	2
Semester when the course unit is delivered	3 and 4
Course Coordinator	Assoc. Prof. Dr. Huseyin HACI
Name of Lecturer (s)	Varies
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:
Each master's student is to conduct research in the form of Master's thesis.

Objectives of the Course:
Collecting, interpreting, applying, and disseminating related data by taking social, scientific, cultural and ethical values into account.

Learning Outcomes

After completing the course the student will be able to		Assessment
1	develop and deepen the knowledge achieved.	2,3,4,5
2	interpret and integrate knowledge from different disciplines and generate and analyze new information.	2,3,4,5

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Ability to apply fundamental knowledge of science and Electrical Engineering.	5
2	Ability to identify, formulate and solve complex electrical engineering problems.	5
3	Ability to design and conduct experiments related to Electrical Engineering, as well as to analyse and interpret data.	5
4	Be able to design a complex system, component, or process to meet desired needs within realistic constraints.	5
5	Be able to develop solutions that meet the desired needs within the economic, manufacturing and sustainability borders.	4
6	Be able to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice and research.	5
7	Be able to function and communicate effectively in multidisciplinary teams.	2

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1-30	Conducting research	

Recommended Sources
Books, articles and other scientific documents related to the field

Assessment
Thesis defense 100%

Assessment Criteria
Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies
Governed by Graduate Education Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	32	1	32
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	60	3	180
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	-	-	-
Final Examination	-	-	-
Self-Study	320	4	1280
Total Workload			1492
Total Workload/30(h)			49.73
ECTS Credit of the Course			50