COURSE INFORMATION FORM

Faculty	**Faculty of Engineering**	
Program	**B.Sc. in Civil Engineering**	**Elective**
	B.Sc. in Computer Engineering	**Required**
	B.Sc. in Electrical-Electronics Engineering	**Elective**
	B.Sc. in Industrial Engineering	**Elective**
	B.Sc. in Mechanical Engineering	**Elective**

Course Code	COMP 206			
Course Title in English	Computer Architecture			
Course Title in Turkish	Bilgisayar Mimarisi			
Language of Instruction	English			
Type of Course	Flipped Classroom			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	10	30	60	-
Semester Offered	Spring			
Contact Hours per Week	Lecture:3	Recitation:-	Lab:-	Other:-
Estimated Student Workload	156			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	EE 203			
Expected Prior Knowledge	Some exposure to C programming language or other high-level computer programming languages. Exposure to digital logic circuit design is a must.			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To learn computer organization, memory, i/o subsystems, processor design and latest computer hardware technology trends.			
Course Description	This course introduces the basics of the computer organization and architecture, design of processors, main memory, and i/o devices. It also involves understanding the concept of programs as sequences of machine instructions; understanding the relationship between assembly language and machine language; writing programs using assembly languages; understanding the relationship between high-level compiled languages and assembly languages; understanding arithmetic and logical operations with integer operands; understanding floating-point number systems and operations; understanding data path and controller designs; understanding cache structures and virtual memories; understanding and implementing basic pipelining concepts and learning about advanced microarchitecture concepts such as branch prediction and multithreading.			
Course Description in Turkish	Bu ders bilgisayar organizasyonu ve mimarisi temellerine, işlemci, ana bellek ve girdi/çıktı devre tasarımına girişi amaçlamaktadır. Ayrıca, yazılan programların makine dili olarak algılanması; donanım dili ile makine dili arasındaki ilişkinin anlanması ve donanım dilinde program yazılması; aritmetik ve mantık operasyonlarının tam sayılı ve kayan noktalı işlemler yapılmasının anlanması; Veri yolu ve kontrolcü devrelerin tasarımlarının yapılması; Ön bellek ve sanal bellek yapılarının anlanması; temel küme komut işleme tekniklerinin gerçeklenmesi ve tasarımı ve son olarakta ileri mikroişlemci yapıları olan çoklu islem görme ve dallanma öngörüsü gibi tekniklerin öğrenilmesi öngürülmektedir.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to be able to: 1. understand computer organization and architecture; 2. analyze and synthesize logic components of a simple computer collectively using software tools;			

	3. use assembly languages, write low-level programs for a given computer architecture; 4. apply the mathematical background and coding skills to design fairly complicated computer systems.

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Program Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(a) an ability to apply knowledge of mathematics, science, and engineering	S	(1,2,3,4)	Exams, Project, HWs
(b) an ability to design and conduct experiments, as well as to analyze and interpret data			
(b)-1. an ability to design/develop an experiment by identifying required assumptions, constraints, data collection methods and models			
(b)-2. Implement experimental procedures to conduct an experiment and use engineering judgment to draw conclusions			
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	(1,2,4)	Projects
(d) an ability to function on multidisciplinary teams			
(d)-1. Function effectively on a intradisciplinary team	S	(2,4)	Projects
(d)-2. Function effectively on a multidisciplinary team			
(e) an ability to identify, formulate, and solve engineering problems	H	(2,3,4)	Exams, Projects In-class exercises, HWs
(f) an understanding of professional and ethical responsibility			
(g) an ability to communicate effectively			
(g)-1. Communicate effectively with well-organized written documents	S	(4)	Projects
(g)-2. Communicate effectively verbally with a range of audiences			
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context			
(i) a recognition of the need for, and an ability to engage in life-long			Projects, HWs
(j) a knowledge of contemporary issues	S	(1,4)	Classrooms, Projects
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	H	(2,3,4)	Exams, Projects, HWs

Prepared by and Date	Assoc. Prof. Dr. Şuayb Ş. Arslan / 1 June 2017	
Semester	Spring 2017-2018	
Name of Instructor	Assoc. Prof. Dr. Şuayb Ş. Arslan	
Course Contents	Week	Topic
	1.	Introduction to Computer Architecture (overview)
	2.	Technology, Cost, Performance and Reliability (metrics)
	3.	Computer Design Basics (Datapath)
	4.	Instruction Set Architecture (ISA), Computer Design Basics (Control)

	5.	MIPS ISA, Assembly language
	6.	MIPS ISA, Assembly language
	7.	Midterm 1
	8.	RISC and CISC Architectures
	9.	Cache/Memory Systems and Hierarchies
	10.	Input/output and storage subsystems
	11.	Pipelining
	12.	Pipelining
	13.	Midterm 2
	14.	Advanced concepts (Multicore architectures, Multithreading, Branch prediction)
	15.	Final Examination Period
	16.	Final Examination Period

Required/Recommended Readings	*Logic & Computer Design Fundamentals*, 5/E, M. Morris R. Mano, Charles R. Kime, Tom Martin *Computer Organization and Design*, The Hardware/Software Interface, 5th Edition, David Patterson and John Hennessy.
Teaching Methods	Lectures/contact hours using 'flipped classroom'
Homework and Projects	5 Homeworks and 1 project
Laboratory Work	-
Computer Use	Required
Other Activities	Report writing for the project.
Assessment Methods	Types of assessment : Midterm Exams: Number 2, Ratio (%) 30 (each contributing %15) Project: 1, 20 Homeworks*: 5, 20 (each contributing %4) * *Similar questions to practice examples that appear on Videos (to measure FC performance)* Final Exam: 1, 30 Total: 100
Course Administration	**Instructor's office and phone number, office hours, email address:** - Office: 5th Floor, right across the entrance. - Phone number: 0212 395 3735 - Email address: arslans@mef.edu.tr **Rules for attendance, late submissions, missing an exam, etc.:** Attendance is not enforced by any means and yet it is highly encouraged for getting a successful letter grade. Late submissions may end up in 5 points penalty for each day past the deadline. Provided that proper documents are presented, each missed midterm by the student will be given the grade of the final exam. No make-up exam shall be given. **A reminder of proper classroom behavior, code of student conduct:** YÖK regulations. **Statement on plagiarism:** Plagiarism or any type of ethical misconduct shall not be tolerated. For more information, please see the corresponding YÖK regulations found at http://3fcampus.mef.edu.tr/uploads.cms.webadmin.mef.edu.tr/4833_2.pdf

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Explanation
	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture/Flipped Classroom	14	2	2	0	56	A*(B+C+D)
Midterm(s)	2	15	2	0	34	A*(B+C+D)
Labs						
Term Project	1	12	3	0	15	A*(B+C+D)
HWs	5	4	1	0	25	A*(B+C+D)
Final Examination	1	24	2	0	26	A*(B+C+D)
Total Workload					156	
Total Workload/25					6,24	

PROGRAM CRITERIA

Computer Engineering Program Criteria

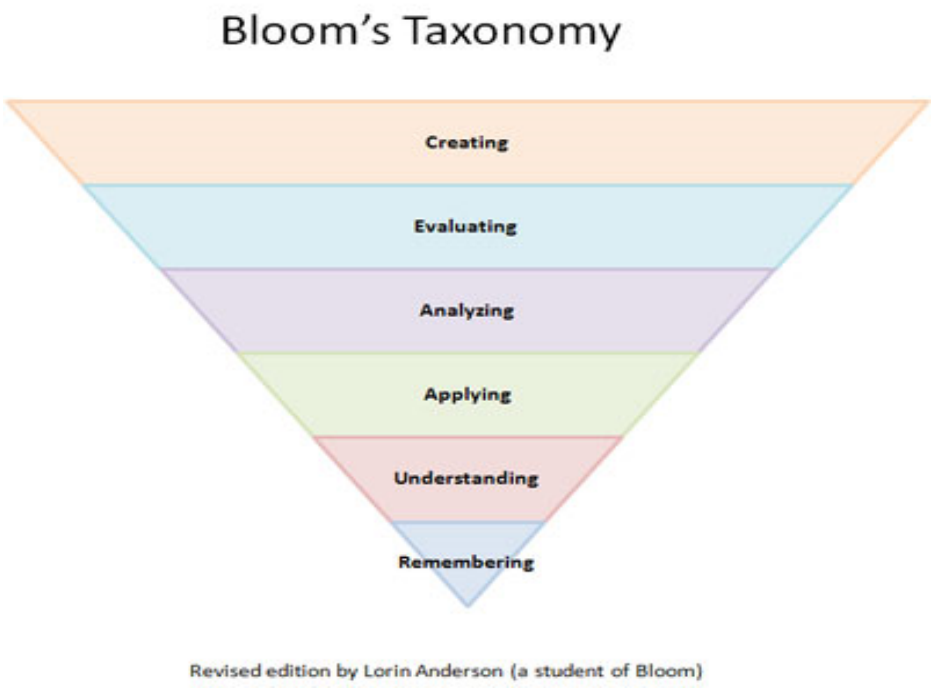
A1. Breadth in computer engineering practice, analysis and design with 17 required course, and depth in one or more fields with 11 electives.

A2. Knowledge of mathematics, including differential and integral calculus, basic sciences, computer science, and engineering sciences that is necessary for analysis and design of complex electrical and electronic devices, software, and systems containing hardware and software components.

A3. Knowledge of probability and statistics, including application to computer engineering; knowledge of advanced mathematics, including differential equations, linear algebra, complex variables, and discrete mathematics.

Note: For program-specific courses ABET Program Criteria of the related engineering program will be put here as before.

Key verbs for cognitive domain in writing learning outcomes and competences:



Key Verbs:

Remembering: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.

Understanding: comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, and translates.
Applying: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.
Analyzing: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.
Evaluating: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports.
Creating: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.

Key verbs for affective domain in writing learning outcomes and competences:

Receiving Phenomena: asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits, erects, replies, uses.
Responding to Phenomena: answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes.
Valuing: completes, demonstrates, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works.
Organizing: adheres, alters, arranges, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.
Internalizing values: acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies.