ECTS 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
	15	65	20	-
Semester Offered	Spring			
Contact Hours per Week	Lecture:3 hours	Recitation:-	Lab:-	Other:-
Estimated Student Workload	143 hours			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	EE 203 Digital System Design			
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 architectural 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 multicore implementations.			
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 çoklu çekirdek gerçeklemesi gibi tekniklerin öğrenilmesi öngürülmektedir.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: 1. comprehend computer architecture basics, cost-performance trade-offs, design of instruction set architectures; 2. synthesize logic components of a smart computer collectively using software tools; 3. communicate individual designs with a range of audience;			

	4. write low-level programs using assembly languages, compile it for a given computer architecture; 5. comprehend memory hierarchy, apply logic basics to design cache and memory architectures; 6. obtain ability to develop input/output and storage subsystems; 7. apply probability and statistics in cache, virtual memory and general subsystem design; 8. apply the mathematical background and coding skills in a group project to design fairly complicated computer systems.

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1,4,5,6	Exams, Projects, Quizes
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	H	2	Exams, Projects
(3) an ability to communicate effectively with a range of audiences	S	3	Projects
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	S	8	Projects
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	S	7	Exams, Quizzes
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Assoc. Prof. Dr. Şuayb Ş. Arslan / December 2019	
Semester	Spring 2019-2020	
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.	Trade-offs, design challenges for ISA, MIPS ISA
	6.	Sample ISAs: MIPS, Assembly language
	7.	HCPU ISA, Assembly language (Midterm 1)
	8.	RISC and CISC Architectures
	9.	Cache/Memory Systems and Hierarchies
	10.	Input/output and storage subsystems
	11.	Pipelining Basics I (Logical)
	12.	Pipelining Basics II (Hardware)
	13.	Advanced concepts: Multicore architectures (Midterm 2)
	14.	Advanced concepts: Multithreading, Branch prediction
	15.	Final Exam/Project/Presentation Period

	16.	Final Exam/Project/Presentation 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	No HWs, 14 Quizes/FC and 1 project	
Laboratory Work	-	
Computer Use	Required	
Other Activities	Presentation, Report writing for the project.	
Assessment Methods	Types of assessment / Number / Ratio (%) Midterm Exams / 2 / 42 (each contributing %21) Project / 1 / 30 Quizes/FC* / 14 / 28 (each contributing %2) Total / / 100 * *Selected questions from handouts (to measure FC performance)*	
	Instructor's office and phone number, office hours, email address: - Office: 5th Floor, Room 573; Phone number: 0212 395 3735; Email: 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/Q	14	3.5	0.5	0	56	A*(B+C+D)
Midterm(s)	2	25	2	0	54	A*(B+C+D)
Labs						
Term Project	1	30	3	0	33	A*(B+C+D)
Homeworks						A*(B+C+D)
Final Examination						A*(B+C+D)
Total Workload					143	
Total Workload/25					5.72	