COURSE INFORMATION FORM

Faculty	**Faculty of Engineering**	
Program	**B.Sc. in Electrical-Electronics Engineering**	**Elective**
	B.Sc. in Industrial Engineering	**Elective**
	B.Sc. in Computer Engineering	**Required**
	B.Sc. in Mechanical Engineering	**Elective**
	B.Sc. in Civil Engineering	**Elective**
Semester	**Fall 2015-2016**	

Course Code	MATH 321			
Course Title in English	Automata Theory and Formal Languages			
Course Title in Turkish	Biçimsel Diller ve Otomatlar Kuramı			
Language of Instruction	English			
Type of Course	Flipped Classroom			
Level of Course	Undergraduate Introductory			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	50	20	20	10
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab:-	Other:-
Estimated Student Workload	130-180 hours per semester.			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	None			
Expected Prior Knowledge	Basic Discrete Mathematics and Data Structures Knowledge			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To understand fundamentals of theory of computation, basic graph theory and introductory discrete mathematics, learn the classification between classes of languages (regular, context-free, and more) and design grammars and machines that will generate/recognize these languages.			
Course Description	This course covers the fundamentals of theory of computation: basic graph theory, introductory discrete mathematics, regular languages, finite state machines, push-down automata, regular expressions, context-free grammars, Turing machines, decidability, reducibility, time complexity			
Course Description in Turkish	Bu derste, biçimsel diller ve otomatlar kuramının temel kavramları şu başlıklar altında işlenmektedir: temel çizge teorisi, sonlu küme matematiğine giriş, düzenli diller, sonlu durum makineleri, ters otomat, düzenli ifadeler, bağlama duyarsız gramerler, Turing makineleri, karar verilebilirlik, indirgenebilirlik, zaman karmaşıklığı			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to be able to: 1. Know basic discrete mathematics and graph theory 2. Understand finite state machines, regular languages, regular expressions, determinism and nondeterminism and their connection 3. Understand context-free languages, push-down automata and their connection 4. Understand Turing machines 5. Understand decidability, reducibility, and time complexity			

Relation to Student Outcomes and Competences: N=None S=Supportive H=Highly Related

Relationship of the Course with the Student Outcomes and Competences	**Level**	**Assessed by**
	N/S/H (Related Learning Outcomes)	Exam, Project, HW, Lab, Presentation, etc.
(a) an ability to apply knowledge of mathematics, science, and engineering	H (1, 2, 3, 4, 5)	Exams, homeworks, quizzes
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	N	
(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	Exams, homeworks, Quizzes
(d) an ability to function on multidisciplinary teams	N	
(e) an ability to identify, formulate, and solve engineering problems	S (1, 2, 3, 4, 5)	Exams, homeworks, quizzes
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate effectively	N	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	N	
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	N	

Prepared by and Date	Assist. Prof. Aydın Ulaş / September 2016	
Name of Instructors	Assist. Prof. Aydın Ulaş	
Course Contents	Week	Topic
	1.	Basic Discrete Mathematics and Graph Theory
	2.	Basic Discrete Mathematics and Graph Theory
	3.	Finite State Machines and Regular Languages
	4.	Finite State Machines and Regular Languages
	5.	Nondeterminism and Regular Expressions
	6.	Equivalence of Regular Expressions and Finite State Machines
	7.	Nonregular Languages and Pumping Lemma
	8.	Nonregular Languages and Pumping Lemma
	9.	Context-Free Grammars and Ambiguity
	10.	Push-Down Automata
	11.	Turing Machines
	12.	Turing Machines
	13.	Advanced Topics (Decidability, reducibility, time complexity)
	14.	Advanced Topics (Decidability, reducibility, time complexity)
	15.	Final Examination Period.
	16.	Final Examination Period.

Required/Recommended Readings	Introduction To The Theory Of Computation – Michael Sipser 3rd ed.
Teaching Methods	Flipped classroom. Students work individually for homeworks
Homework and Projects	Homeworks and quizes
Laboratory Work	None
Computer Use	None
Other Activities	None
Assessment Methods	3 Midterms (30%, 25%, 30%), homeworks/quizes (15% total, 3% each)
Course Administration	Aydın Ulaş **E-mail:** ulasa@mef.edu.tr **Office Hours:** Wednesdays 12:30-13:30. **Rules for attendance:** No attendance required. **Missing a quiz:** Provided that proper documents of excuse are presented, each missed quiz by the student will be given a grade which is equal to the average of all of the other quizzes. No make-up will be given. **Missing a homework:** Within 24 hours of the submission deadline, the homework grade will be divided into two. After 24 hours, the homework will be accepted not submitted. **Missing a midterm**: Provided that proper documents of excuse are presented, each missed midterm by the student will be given a grade according to the average and standard deviations of other midterms and students' grades on the other midterms. No make-up will be given. **Missing a final**: There will be no final. **A reminder of proper classroom behavior, code of student conduct**: YÖK Regulations **Statement on plagiarism**: YÖK Regulations http://3fcampus.mef.edu.tr/uploads/cms/webadmin.mef.edu.tr/4833_2.pdf

ECTS Student Workload Estimation

	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture	14	2	3		70	A*(B+C+D)
Lab etc.					0	
Midterm(s)	2	12	2		28	A*(B+C+D)
Assingment, Project, Presentation	5	2	3		25	A*(B+C+D)
Final Examination	1	24	2		26	A*(B+C+D)
Total Workload					149	
Total Workload/25					5.96	
ECTS					**6**	

PROGRAM CRITERIA

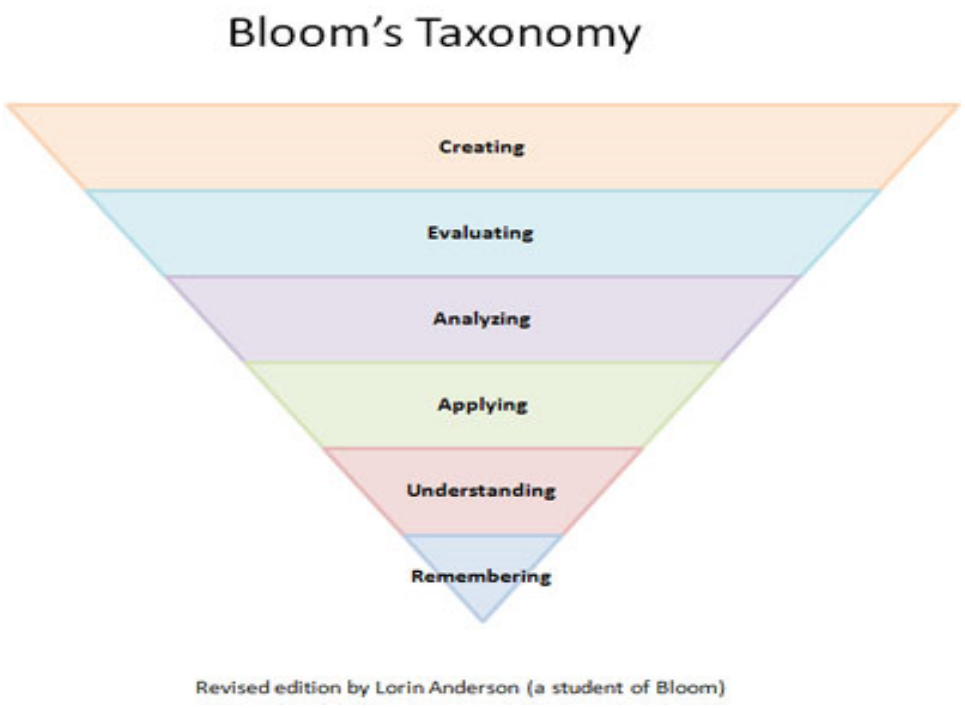
Computer Engineering Program Criteria

A1. Breadth in computer engineering practice, analysis and design with **18** required course, and depth in one or more fields with **4** 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.

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, 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.