Faculty	Faculty of Engineering	
Program	B.Sc. in Civil Engineering	Elective
	B.Sc. in Computer Engineering	Elective
	B.Sc. in Electrical-Electronics Engineering	Elective
	B.Sc. in Industrial Engineering	Elective
	B.Sc. in Mechanical Engineering	Elective
Semester	Spring 2016-2017	

Course Code	COMP 461			
Course Title in English	Computer Graphics			
Course Title in Turkish	Bilgisayar Grafikleri			
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	70	20	-
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab:-	Other:-
Estimated Student Workload	160 hours per semester			
Number of Credits	5 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	None			
Expected Prior Knowledge	Prior knowledge in programming and, and in general fundamentals of linear algebra is expected.			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To acquire a basic knowledge and understanding of important concepts of computer graphics to develop skills in ray tracing, the graphics pipeline, transformations, texture mapping, shadows, sampling, global illumination, splines, animation and color.			
Course Description	This course provides a comprehensive introduction to some fundamental aspects of computer graphics such as ray tracing, the graphics pipeline, transformations, texture mapping, shadows, sampling, global illumination, splines, animation and color.			
Course Description in Turkish	Bu derste; bilgisayar grafiğinin temel kavramları şu konu başlıklar altında kapsamlı bir şekilde incelenmektedir: ışın izleme, grafik sistemlerinin genel akışı, dönüşümler, doku kaplama, gölgelendirme, örnekleme, ışıklandırma, eğriler, animasyon ve renk.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: 1. Design a ray tracing system. 2. Apply geometric transformations.			

3.   Use different illumination models to illuminate a scene.
4.   Use splines to model complex shapes.

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 and Activities)	Exam, Project, HW, Lab, Presentation, etc.
(a) an ability to apply knowledge of mathematics, science, and engineering.	H (1,2,3,4)	Exams, Assignments
(b) an ability to design and conduct experiments, as well as to analyze and interpret data.		
(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.		
(d) an ability to function on multidisciplinary teams.		
(e) an ability to identify, formulate, and solve engineering problems.	H (1,2,3,4)	Exams, Assignments
(f) an understanding of professional and ethical responsibility.		
(g) an ability to communicate effectively.	S	Assignment Presentations
(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 learning.		
(j) a knowledge of contemporary issues.	S	Assignments
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.		

Prepared by and Date	Asst. Prof. Dr. Berk Gökberk / January 2017
Name of Instructor	Asst. Prof. Dr. Berk Gökberk

Course Contents	Week	Topic
	1.	Overview of graphics systems; applications; hardware
	2.	Ray tracing
	3.	Ray tracing
	4.	Graphics and raster graphics algorithms for drawing in 2D
	5.	Geometrical transformations in 2D and 3D
	6.	Viewing in 3D
	7.	Color and shading
	8.	Visible surface determination
	9.	Illumination and shading
	10.	Ilumination and shading
	11.	Modeling curves: implicit,explicit and parametric; emphasis on cubic polynomials
	12.	Surface modeling: Bicubic Bezier polynomials
	13.	Surface modeling: Other approaches

|	14.	Introduction to more advanced topics and applications
	15.	Final Examination Period.
	16.	Final Examination Period.
Required/Recommended Readings	Fundamentals of Computer Graphics, Peter Shirley, Michael Ashikhmin, Steve Marschner	
Teaching Methods	Flipped Classroom	
Homework and Projects	Assignments	
Laboratory Work	-	
Computer Use	Required	
Other Activities	-	
Assessment Methods	Types of assessment: Number Ratio (%) Midterm Exams 1 30 Assignments 4 30 (each contributing 7.5%) Final Exam 1 40	

Course Administration	**Instructor's office and phone number**: MEF 5th Floor
	       office hours: TBA
	       email address: gokberkb@mef.edu.tr
	Rules for attendance: Minimum of 70% attendance required.
	Missing a midterm: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given.
	Missing a final: Faculty regulations.
	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	Activity	Weeks	Hours			Calculation	Explanation
		eks per Semes	g for the Activity (B)	the Activity Itself	ng the Activity Require		
	Lecture	14	2	2	2	84	*(B+C+D)
	Quizzes						A*(B+C+D)
	Assignments	4	1	4	1	24	*(B+C+D)
	Midterm(s)	1	8	3		11	*(B+C+D)
	Final Examination	1	12	2		14	*(B+C+D)
	Total Workload					133	
	Total Workload/					5,32	
	ECTS					**5**	

PROGRAM CRITERIA

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

2. 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.

3. 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:

Bloom's Taxonomy
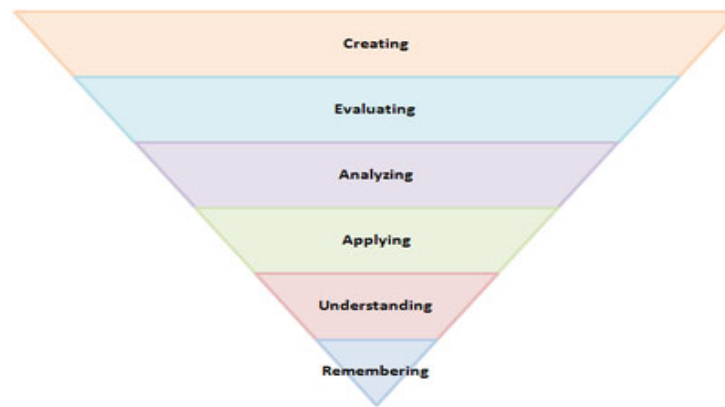
Revised edition by Lorin Anderson (a student of Bloom)

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.