

CURVES AND SURFACES IN ARCHITECTURE

2022/23. 1. SEMESTER

BASIC DATA			
COURSE NAME	Görbék és felületek az építészetben		Curves and surfaces in Architecture
COURSE CODE(S)	YAVGFÉPMNF		
DEPARTMENT	Óbuda University, Ybl Miklós Faculty of Architecture, Institute of Architecture		
PROGRAMME, TRAINING	Architect MSc		full time
COURSE INSTRUCTOR (Instructor managing the course)	Dr. habil Bölcskei Attila PhD,	Bolcskei.Attila@ybl.uni-obuda.hu	Consultations: Monday 16.15-17.00, Tuesday: 16.15-17.00 sending a preliminary e-mail is necessary
INSTRUCTORS, LECTURERS	Dr. habil Bölcskei Attila PhD,	Bolcskei.Attila@ybl.uni-obuda.hu	Consultations: Monday 16.15-17.00, Tuesday: 16.15-17.00 sending a preliminary e-mail is necessary
PRE-REQUIREMENT	-		
HOURS OF LECTURES (WEEKLY)	-		
HOURS OF CLASSROOM TRAINING/ LABORATORY TRAINING (WEEKLY)	2 hours		
FIELD WORK AND TRAINING (WEEKLY)	0 hours		
ASSIGNMENT	Homeworks, models, presentation, test		
CREDITS	3 credits (ECTS)		
AIM OF THE COURSE, BRIEF DESCRIPTION	Classical chapters from the Greek traditions: conic sections, divina proportione, cyclois, epi and hypocycloids, evolvent, cissoid, strophoid, conchois, lemniscate and other algebraic curves. Generation of curves and surfaces by motion, by iteration, by other constructions. Splines and the de Casteljau algorithm. Problems of representation of spatial curves. Modeling of famous polyhedral (Platonic, Archimedean, Johnson, etc). Modeling and representation of surfaces generated by motions (eg. helical surfaces, Archimedes pipe surface). Surfaces in Architecture. Surfaces generated by iteration or other construction. Möbius band and Klein bottle. .		
RECOMMENDED LITERATURE	Internet, I. N. Bronshteĭn, K. A. Semendĭaev: A Guide Book to Mathematics: Fundamental Formulas · Tables · Graphs · Methods M. D. Coxeter: Introduction to Geometry Pottmann, Asperl, Hofer, Kilian: Architectural Geometry. Bently Institute Press, 2007		
REQUIRED TECHNICAL APPLIANCES/ SOFTWARE	Contact: Neptun, E-learning and E-mail. Education materials: According to E-learning		

SCHEDULE OF THE SEMESTER		
WEEK	LESSON	TASK
1.	Introduction. Conic sections, properties	
2.	Conic sections: constructions	1. home work
3.	Description of curves by formulas: analytic descriptions, coordinate systems, basic differential geometry. Neil-parabola, Folium of Descartes, cissoids, strophoids, conchoids, lemniscate	
4.	Generation of planar curves by iteration, de Casteljau algorithm, splines	
5.	Workshop – no class	
6.	Golden ratio, series of Fibonacci, constructions	
7.	Generation of curves by motion: Cycloids, epi- and hypocycloids, involute, evolvent	
8.	Spirals, other constructive methods.	2. home work
9.	Famous polyhedra (Platonic, Archimedean, Johnson, etc.)	1. modeling
10.	Classification of algebraic surfaces and applications in Architecture. Modeling	
11.	Surfaces of second order	2. modeling
12.	Generation of surfaces by motions: helical surfaces, pipe of Archimedes	
13.	Other constructive methods, Möbius band, Klein bottle, conoid of Plücker	

REQUIREMENTS FOR THE COMPLETION OF THE SEMESTER		
MID-SEMESTER TASKS AND TESTS (Descriptive Geometry part)		
Requirement	Description	Value (point, %, grade)
PARTICIPATION AT LESSONS	The practice lessons can be missed up to three times (see § 46 ETVSZ)	-
IN CASE OF ABSENCE FROM LESSONS AND EXAMINATIONS	Absence is considered to be justified with a medical certificate presented.	-
Homeworks	Two times in a semester the students solve home works with independent work. Each homework scores 10 points. The missing/false solutions must be repeated until they are complete/correct.	2 x 10 points
Model	Two times representative model of a surface must be completed. The missing/false solutions must be repeated until they are complete/correct.	2 x 10 points
Presentation	Once in the semester each student (in pairs or individually) gives a lecture. The presentation, depending on the topic, should contain at least one guided construction or modeling. The topics are discussed with the instructor during the semester and the students have to consulte at least once. The presentation (in electronic form) must be sent to the instructor.	20 points
TOTAL		60 points

SEMESTER CLOSING REQUIREMENTS					
CONDITIONS FOR OBTAINING A SIGNATURE	<ul style="list-style-type: none"> - Three (3) or less absences. - Home works and models: at least 20 points in total. - Presentation: at least 10 points. 				
SIGNATURE RETAKE EXAM	<p>In case of three or less absences, and if the student's semester performance reaches at least 40%, he/she can take a signature retake exam at the beginning of the examination period. In doing so, a complex test involving constructions and theory must be solved, with a result of at least 50%, in 90 minutes.</p> <p>If any of the above conditions is not fulfilled, we cannot provide the possibility to take part at the signature retake exam.</p>				
SEMESTER GRADE	0-29 point	30-37 point	38-45 point	46-53 point	54-60 point
	1 - FAIL	2 - PASS	3 - SATISFACTORY	4 - GOOD	5 - EXCELLENT