

MatGeom in Arch

BSc

Mathematics and Geometry in Architecture

C-course/WS

SGYMMAT2810ER

BASIC INFORMATIONS

LECTURER	Prof. Gyula NAGY PhD	
TOPIC	Topics: golden ratio, Platonic solids, Polyhedrons, linear and affine transformations, transformation groups, symmetry groups, tiling, mathematical crystallography, the science of Escher, planar graphs, quadratic curves and surfaces. Polyhedrons. The classes will be held in a computer lab, and 3D Geometrysoftware will be used to demonstrate the examined problems	
LECTURE (WEEKLY)	1 x 1 hours (45')	2 credits
WORKSHOP (WEEKLY)	1 x 1 hours (45')	
EXAM/TEST/TASK	0 / 1 / 1 paper or presentation	

AIM AND METHODS OF THE COURSE:

The aim of this course is to highlight to the connection between Mathematics and Architecture from ancient times until nowadays, with a special emphasis on Geometry. The course develops mathematical models from the ancient ages to now days and computer representations for solid objects and other practically useful knowledge from mathematics, geometry, and mechanics. The calculation of mass properties (e.g., volume and rigidity), the detection of spatial interferences, and the computation of some properties of some physical object will be discussed.

We use some software for calculation (Excel) and design AutoCAD.

We are waiting for engineering students who are interested in the mathematical and mechanical aspects of three-dimensional geometry, and who are interested in the use of geometry in design and production. The course is between basic theory and practical applications. You are welcome to collaborate on problems, but your papers must be your own. Physical copies of your solutions are required, including any physical object.

OUTLINE FOR THE SEMESTER

WEEK	WORKSHOP	DEADLINE
1	Harpenodaptai: Rope stretchers or engineers	
2	Greek Geometry	
3	Euler's Polyhedron theorem	
4	Platonic Solids	
5	Vaults, Cavalieri 's principle	
6	Domes, catenary (chain curve)	
7	Matrices of transformations	Project
8	Rigid structures by Maxwell	
9	Tensegrity framework	
10	Transformation groups, symmetry of textures	
11	Tiling, packing, covering	Test
12	Geometric algorithm	Project dead line
13	Parametric and algorithmic design	

TASK / EXAM

	DESCRIPTION	TO HAND IN	SCORE
Project	The main requirement for this course is the project. The project consists of one of the two components: A paper describing what you did. If your project involves writing an article, then you should submit to a Free Plagiarism Checker . A presentation describing that you did a physical object, you should show it during your presentation.	article or presentation and a physical or presentation and a virtual object	50
Test	matrix, curves, length of the arc, surface area, volume		50
TOTAL			100

EVALUATION

0-55 points	56-65 points	66-75 points	76-85 points	86-100 points
1- FAILED	2 - SUFFICIENT	3 - SATISFACTORY	4 - GOOD	5 - EXCELENT