SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babes-Bolyai University Cluj-Napoca
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Mathematics
1.4 Field of study	Mathematics
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Mathematics and Computer Science (English)

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)	**Geometrie I (Geometrie Analitică)/Analytic Geometry**					
2.2 Course coordinator	**Lect. dr. George Țurcaș**					
2.3 Seminar coordinator	**Lect. dr. George Țurcaș**					
2.4. Year of study **I**	2.5 Semester **1**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Compulsory**	
2.8 Code of the discipline	MLE0013					

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28

Time allotment:	hours
Learning using manual, course support, bibliography, course notes	20
Additional documentation (in libraries, on electronic platforms, field documentation)	20
Preparation for seminars/labs, homework, papers, portfolios and essays	20
Tutorship	14
Evaluations	10
Other activities: homework	10

3.7 Total individual study hours	94
3.8 Total hours per semester	150
3.9 Number of ECTS credits	6

4. Prerequisites (if necessary)

4.1. curriculum	• None necessary

4.2. competencies	• Basic knowledge of algebra, trigonometry and elementary geometry

5. Conditions (if necessary)

5.1. for the course	•
5.2. for the seminar	• Attendance to at least 75% of the seminars.

6. Specific competencies acquired

Professional competencies	C1.1 The ability to identify concepts, theories and use of specific description language C2.1 The ability to identify basic concepts used in the description of specific phenomena and processes C4.5 The ability to produce a mathematical model for a certain problem.
Transversal competencies	CT1. Applying rigorous and efficient work rules, displaying a responsible attitude towards the scientific and educational and creative order to maximize their potential in specific situations with respect to the basic principles and norms of professional ethics

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• Acquiring theoretical and practical knowledge necessary for understanding the principles and methods of analytic geometry.
7.2 Specific objective of the discipline	• Introduction of basic notions for analytic geometry (vectors, coordinates, straight lines, planes, conic sections and quadric surfaces), the study of their properties and of the relations between them, by means of the geometric transformations.

8. Content

8.1 Course	Teaching methods	Remarks
1. Vector algebra and coordinates (3 lectures)	Lecture, description, exemplifications by using multimedia tools	
2. The straight line in the plane (1 lecture)	Lecture, description, exemplifications by using multimedia tools	
3. The line and plane in space (2 lectures)	Lecture, description, exemplifications by	

	Teaching methods	Remarks
	using multimedia tools	
4. Isometries and affine transformations in the plane (2 lectures)	Lecture, description, exemplifications by using multimedia tools	
5. Conic sections. Reduction to the canonical equation (3 lectures)	Lecture, description, exemplifications by using multimedia tools	
6. Quadric surfaces on the canonical equations (1 lecture)	Lecture, description, exemplifications by using multimedia tools	
7. Generated surfaces (1 lecture)	Lecture, description, exemplifications by using multimedia tools	
8. Isometries and affine transformations in space (1 lectures)	Lecture, description, exemplifications by using multimedia tools	

Bibliography
1. D. Andrica, L. Topan - Analytic Geometry, Cluj University Press, 2004 (main textbook)
2. M. Audin - Geometry, Springer, 2003
3. M. Berger - Geometry (vol. I and II), Springer, 1987
4. P.A. Blaga – Geometrie si grafica I (lecture notes available on the author website)
5. P. A. Blaga - Lectures on Classical Differential Geometry, Risoprint, 2005
6. M. P. Deisenroth, A. A. Faisal, C. S. Ong - *Mathematics for Machine Learning,* Cambridge University Press, 2020.
7. D.F. Rogers, J.A. Adams - Mathematical Elements for Computer Graphics (2nd edition), McGraw-Hill, 1990
8. C. Pintea - Geometrie. Elemente de geometrie analitca. Elemente de Geometrie diferențială a curbelor și suprafețelor, Cluj University Press, 2001.
9. M. Reid, B. Szendroi- *Geometry and Topology,* Cambridge University Press, 2005.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Vector algebra and coordinates (3 seminars)	Description, explanation, independent and/or team study	
2. The straight line in the plane (1 seminar)	Description, explanation, independent and/or team study	
3. The line and plane in space (2 seminars)	Description, explanation, independent and/or team study	

4. Isometries and affine transformations in the plane (2 seminars)	Description, explanation, independent and/or team study	
5. Conic sections. Reduction to the canonical equation (3 seminars)	Description, explanation, independent and/or team study	
6. Quadric surfaces (1 seminar)	Description, explanation, independent and/or team study	
7. Generated surfaces (1 seminar)	Description, explanation, independent and/or team study	
8. Isometries and affine transformations in space (1 seminars)	Description, explanation, independent and/or team study	

Bibliography
1. S.L. Atanasijan, V. I. Glizburg – Culegere de probleme de geometrie, vol. I, Eksmo Education, Moscova, 2000 (in Russian)
2. C. Coşniţă - Culegere de probleme de geometrie analitică, Editura didactică şi pedagogică, 1963
3. D. Kletenik – Problems in Analytic Geometry, Mir Publishers, Moscow, 1969
3. C. Ionescu-Bujor, O. Sacter - Exerciţii şi probleme de geometrie analitică şi diferenţială, volumul I,Editura didactică şi pedagogică, 1963
4. F. Rado - Culegere de probleme de geometrie, Lito UBB, 1979
5. D. Brannan, M. Esplen – Geometry, Cambridge University Press, Second Edition 2011
5. Ion D. Teodorescu - Geometrie analitică şi elemente de algebră liniară, culegere de probleme (ediţia a IIa), Editura didactică şi pedagogică, 1971

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The notions assimilated are essential for any prospective mathematician or math teacher. Moreover, these competencies are very useful in activities related to computer graphics, computer aided geometric design or machine learning.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course		Final written exam	75%
10.5 Seminar/lab activities		Active attendance and seminar test	25%

10.6 Minimum performance standards			

- ➢ The student should attend at least 75% of the seminaries.
- ➢ The grade of the written exam should be at least 5.

Date	Signature of course coordinator	Signature of seminar coordinator
April 29, 2022	Lect. dr. George Țurcaș	Lect. dr. George Țurcaș

Date of approval

Signature of the head of department

April 29, 2022

Prof. dr. Octavian Agratini