SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş Bolyai University
1.2 Faculty	Faculty of Mathematics and Computer Science
1.3 Department	Department Mathematics
1.4 Field of study	Mathematics
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Computer Science

2. Information regarding the discipline

2.1 Name of the discipline			Geometry				
2.2 Course coordinator			Assoc.Prof.PhD. Cornel Pintea				
2.3 Seminar coordinator			Assoc.Prof.PhD. Cornel Pintea				
2.4. Year of study	**I**	2.5 Semester	**2**	2.6. Type of evaluation	**VP**	2.7 Type of discipline	**Compulsory**

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

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar	2 sem
3.4 Total hours in the curriculum	52	Of which: 3.5 course	24	3.6 seminar	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					20
Additional documentation (in libraries, on electronic platforms, field documentation)					10
Preparation for seminars/labs, homework, papers, portfolios and essays					15
Tutorship					15
Evaluations					13
Other activities:					-
3.7 Total individual study hours	73				
3.8 Total hours per semester	125				
3.9 Number of ECTS credits	5				

4. **Prerequisites** (if necessary)

4.1. curriculum	• Elementary algebra
4.2. competencies	• Abilities of logic reasonings • Ability to solve problems of geometry by using geometric figures and calculations.

5. **Conditions** (if necessary)

5.1. for the course	• The classroom should be gifted with a board and video projector. The attendance is strongly recommended.
5.2. for the seminar /lab activities	• The classroom should be gifted with a board and chalk. The attendance is strongly recommended.

6. Specific competencies acquired

Professional competencies	• Knowledge, understanding and use of basic objects and concepts of analytic geometry. • Ability for elementary algebraic calculations. • Ability to work independently and/or in a team in order to solve problems in defined professional contexts.
Transversal competencies	• Ability to apply the knowledge acquired within the course of analytic geometry to understand other courses which require such knowledge. • Ability to model phenomena using the objects of analytic geometry.

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

7.1 General objective of the discipline	• Ability to distinguish the objects of analytic geometry in different contexts. • To get hold of the fundamental formulas of analytic geometry.
7.2 Specific objective of the discipline	• The students are expected to be able to apply vector calculus to solve problems of classical geometry. • The good students are expected to be able to use vector calculus to prove fundamental results of classical geometry such as the Newton Theorem, the Pappus theorems and the Desargues theorem. • The students are expected to be able to use formulas of analytic geometry to compute distances, areas and volumes. • The students are expected to be able to recognize the conics and the quadrics written in reduced equations and to write the equations of associated objects, such as tangent lines invarious fiorms (for conics) and tangent planes in various forms (for quadrics). • The students are expected to recognize quadrics which admit two fammilies of rectilinear generatrices and to write their equations. • The students are expected to be able to write equations of simple generad surfaces such as cylindrical surfaces, conical surfaces, conoidal surfaces and revolution surfaces.

8. Content

8.1 Course	Teaching methods	Remarks
• Vectors and operations with vectors.	• Interactive exposure • Explanation • Conversation • Didactical demonstration	One lecture
2. Reference sytems. Systems of coordinates	• Interactive exposure • Explanation • Conversation • Didactical demonstration	One lecture
• Various equations of lines and planes	• Interactive exposure • Explanation • Conversation • Didactical demonstration	Two lectures
• Vector products (dot product, cross product, triple scalar product)	• Interactive exposure • Explanation • Conversation • Didactical demonstration	Two lectures
• Conics	• Interactive exposure • Explanation • Conversation • Didactical demonstration	Two lectures
• Quadrics	• Interactive exposure • Explanation • Conversation • Didactical demonstration	Two lectures
• Generated surfaces (cylindrical surfaces, conic surfaces, conoidal surfaces, revolution surfaces)	• Interactive exposure • Explanation • Conversation • Didactical demonstration	Two lectures
• Geometric Transformations (reflexions, translations, scalings, projections)	• Interactive exposure • Explanation • Conversation • Didactical demonstration	Two lectures

Bibliography

1. Andrica, D., Ţopan, L., Analytic Geometry, Cluj University Press, 2004.
2. Eggerton, P.A., Hall, W.S., Computer Graphics. Mathematical First Steps, Prentice Hall, 1999.
3. Pintea, C., Geometrie. Elemente de geometrie analitică. Elemente de geometrie diferențială a curbelor și suprafețelor, Presa universitară clujeană, 2001.
4. Smaranda, D., Soare, N., Transformări geometrice, Editura Academiei RSR, București, 1988.

8.2 Seminar	Teaching methods	Remarks
1. Problems on vector algebra with applications in classical geometry.	Explation, dialogue, solving problems	two tutorials
2. Problems involving various equations of lines and planes	Dialogue, debate, examples, solving problems	Two tutorials
3. Problems on vector products (dot product,	Dialogue, debate, case	Two tutorials

cross product, triple scalar product)	studies, examples, solving problems	
4. Problems on associated geometric objects to conics, such as tangent lines and normal lines.	Dialogue, debate, examples, solving problems	Two tutorials
5. Problems on associated geometric objects to quadrics, such as tangent planee and normal line.	Dialogue, debate, examples, solving problems	two tutorials
6. Examples of cylindrical surfaces, conic surfaces, conoidal surfaces and of revolution surfaces.	Dialogue, debate, examples, solving problems	Two tutorials
Problems on reflexions, translations, scalings, projections with applications to classical geometry.	Dialogue, debate, examples, solving problems	Two tutorials

Bibliography

1. Andrica, D., Ţopan, L., Analytic Geometry, Cluj University Press, 2004.

2. Eggerton, P.A., Hall, W.S., Computer Graphics. Mathematical First Steps, Prentice Hall, 1999.

3. Nicolescu, L., Boskoff, V., Probleme practice de geometrie, Ed. Tehnica, Bucureşti, 1990.

4. Pintea, C., Geometrie. Elemente de geometrie analitică. Elemente de geometrie diferențială a curbelor și suprafețelor, Presa universitară clujeană, 2001.

5. Smaranda, D., Soare, N., Transformări geometrice, Editura Academiei RSR, Bucureşti, 1988.

6. Bercovici, M., Rimer, S., Triandaf, A., Culegere de probleme de geometrie analitică și diferențială, Editura didactică și pedagogică, Bucureşti, 1973.

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

- Generally speaking, Geometry, and Analytic geometry in particular, may help the individuals to build a logical thinking based on intuition. This may help to understand other mathematical fields or even other sciences. Also, geometry cultivate the practical skils, from a theoretical point of view, extremely necessary in real life problems.
- The course exists in the studying program of all major universities in Romania and abroad. The content of the course is suitable to build a strong mathematical background.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	The students are expected to know the basic concepts and results of analytic geometry;	● Written midterm exam consisting in theoretical questions alongside applications and problems.	70%

	The students are expected to apply the course concepts in real life situations	● One final quiz consisting in several questions, mostly non-theoretical	
10.5 Seminar	The ability to solve problems which are closed to those solved during the tutorials. Good students are expected to solve problems which require deep knowledge of the important results presented at the course.	● The grade for the tutorial component will consist in a grade for the student's activity within the tutorial during the whole semester.	30%
10.6 Minimum performance standards			
At least grade 5 (from a scale of 1 to 10) at the midterm exam+ final quiz and the tutorial grade.			

Date	Signature of course coordinator	Signature of seminar coordinator
30.04.2014	Assoc.Prof.PhD. Cornel PINTEA	Assoc.Prof.PhD. Cornel PINTEA

Date of approval — Signature of the head of department

..... — Prof. Octavian AGRATINI