

COURSE DESCRIPTION

Introduction to Astronomy Academic year 2026-2027

1. Programme-related data

1.1. Higher Education Institution	Babeş-Bolyai University
1.2. Faculty	Mathematics and Computer Science
1.3. Department	Mathematics
1.4. Field	Mathematics
1.5. Level of study	Bachelor
1.6. Degree programme / Qualification	Mathematics Computer Science (English)
1.7. Form of education	Full-time

2. Course-related data

2.1. Course title	Introduction to Astronomy			Course code	MLE0100
2.2. Course coordinator	Conf. dr. Cristina Blaga				
2.3. Seminar coordinator	Conf. dr. Cristina Blaga				
2.4. Year of study	3	2.5. Semester	5	2.6. Type of assessment	Exam
2.7. Course status	Compulsory		2.8. Course type	Specialisation subject	

3. Total estimated time (hours per semester of teaching activities)

3.1. Number of hours per week	4	of which: 3.2. course	2	3.3. seminar/ laboratory/ project	0/2
3.4. Total of hours in the curriculum	56	of which: 3.5. course	28	3.6. seminar/ laboratory	0/28
Time allocation for individual study (IS) and self-taught activities (ST)					hours
Learning from textbooks, course materials, bibliography, and notes (IS)					20
Additional research in the library, on subject-specific electronic platforms, and on-site					20
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					20
Tutoring (professional guidance)					4
Examinations					4
Other activities					1
3.7. Total hours of individual study (IS) and self-taught activities (ST)				69	
3.8. Total hours per semester				125	
3.9. Number of credits				5	

4. Prerequisites (where applicable)

4.1. curriculum-related	
4.2. skills-related	

5. Specific conditions (where applicable)

5.1. course-related	blackboard, chalk, videoprojector
5.2. seminar/laboratory-related	blackboard, chalk, videoprojector access to the astronomical instruments of the UBB Astronomical Observatory

6.1. Competencies resulting from the completion of the degree programme (as referred to in the curriculum)¹

¹ The professional and/or transversal skills targeted by the subject for which the course description is prepared will be copied from the curriculum of the degree programme. For each competency, the complete entry, including the competency code, will be copied with the exact wording that appears in the curriculum, without any changes.

Professional competencies	
Competency code	Competency
PC1	develop problem-solving strategies
PC2	perform analytical mathematical calculations
PC5	synthesize information
Transversal competencies	
Competency code	Competency
TC1	Interpret mathematical information
TC4	Solve problems

6.2. Learning outcomes relevant to the degree programme (as referred to in the curriculum)²

Learning outcomes targeted by the subject		
Competency code	Knowledge and comprehension	Specific academic skills
PC2, PC3	The student/graduate indicates and recognizes the concepts involved in the requirements of exercises and problems formulated in the curriculum disciplines.	The student/graduate uses numerical methods and software packages to solve constructed mathematical models and interprets the obtained mathematical results from the perspective of the practical problem being modeled.
PC1, PC8, TC3	The student/graduate formulates observations and differentiates notions, properties, and assertions from the core disciplines of mathematics through examples and counterexamples.	The student/graduate identifies and describes the essential elements in the construction of proofs of mathematical assertions (lemmas, propositions, theorems), recognizes errors in reasoning, and corrects them.

7. Subject-specific learning outcomes

The student has acquired the basic concepts of astronomy, concerning the celestial sphere, the positions of the celestial bodies and the phenomena that alter their positions in the sky, the real and apparent motion of the celestial bodies, the structure of the Solar System, the motion and the physical characteristics of its members.

Specific academic skills

The student is able to solve problems of spherical astronomy and motion in the Solar System.

8. Contents

8.1. Course	Teaching and learning methods	Remarks ³
1. Spherical Astronomy. The horizontal, equatorial and ecliptic system of coordinates.	Lecture, description, exemplification using multimedia tools.	
2. Galactic coordinates. Precession and nutation.	Lecture, description, exemplification using multimedia tools.	

If no competency is copied from either of the two categories, the row corresponding to that category is deleted from the table.

² The learning outcomes relevant for the degree programme and targeted by the subject for which the course description is prepared will be listed. The entries, copied without any changes from the Curriculum by subject type (Core Subject/Specialisation Subject/Complementary Subject), are listed under the corresponding competency.

³ For example, organisational aspects, recommendations for students, specific aspects relating to the course/seminar, such as inviting experts in the field, etc.

3. Timekeeping systems (sidereal time, mean solar time, and the equation of time).	Lecture, description, exemplification using multimedia tools.	
4. Time and longitude (legal time, UT). Dynamical Time.	Lecture, description, exemplification using multimedia tools.	
5. Atmospheric refraction. Stellar aberration. Geocentric and stellar parallax.	Lecture, description, exemplification using multimedia tools.	
6. General description of the Solar System. The two-body problem. Kepler's laws.	Lecture, description, exemplification using multimedia tools.	
7. Planetary orbits. The Earth's orbit. Astronomical seasons.	Lecture, description, exemplification using multimedia tools.	
8. The Sun-Earth-Moon system. Phases of the Moon. Solar and lunar eclipses.	Lecture, description, exemplification using multimedia tools.	
9. Physical properties of the planets. Planetary interior and atmospheres.	Lecture, description, exemplification using multimedia tools.	
10. Planetary ring systems. The Roche limit. Surface landforms observed on terrestrial planets.	Lecture, description, exemplification using multimedia tools.	
11. Major natural satellites of the giant planets. Dwarf planets: Ceres and Plutoids.	Lecture, description, exemplification using multimedia tools.	
12. Minor planets (asteroids): orbital parameters, physical properties and chemical composition	Lecture, description, exemplification using multimedia tools.	
13. Comets: orbital properties and structure. Meteoroids, meteors and meteorites.	Lecture, description, exemplification using multimedia tools.	
14. Cosmogony. Theories of Solar System formation.	Lecture, description, exemplification using multimedia tools.	

Bibliography

1. BLAGA, C.: Sistemul nostru solar, Editura Albastra, Cluj-Napoca, 2001.
2. ROY A.E., CLARKE D.: Astronomy: Principles and Practice, Institute of Physics Publishing, 2003
3. URECHE V.: Universul, Astronomie, vol. I, Editura Dacia, Cluj-Napoca, 1982.
4. UNSOLD A., BASCHEK B.: Der neue Kosmos, Springer, 2002.
5. WEIGERT C., WENDKLER H., WISOTZKI L.: Astronomie und Astrophysik, WILEY-VCH, 2005

8.2. Seminar/ laboratory	Teaching and learning methods	Remarks
1. Constellations	Description, explanation, conversation, individual study and / or teamwork.	
2. The planisphere	Description, explanation, conversation, individual study and / or teamwork.	
3. Celestial sphere with GeoGebra I	Description, explanation, conversation, individual study and / or teamwork.	
4. Celestial sphere with GeoGebra II	Description, explanation, conversation, individual study and / or teamwork.	

5. Transformation of coordinates	Description, explanation, conversation, individual study and / or teamwork.	
6. Sunrise and sunset. Length of day and night	Description, explanation, conversation, individual study and / or teamwork.	
7. The Julian date	Description, explanation, conversation, individual study and / or teamwork.	
8. Visibility of a planet from a given location	Description, explanation, conversation, individual study and / or teamwork	
9. Twilight and white nights	Description, explanation, conversation, individual study and / or teamwork	
10. Journey through the Solar System. Solar and lunar eclipses.	Description, explanation, conversation, individual study and / or teamwork	
11. Preparing an astronomical observation session	Description, explanation, conversation, individual study and / or teamwork.	
12. Astronomical events of 2026	Description, explanation, conversation, individual study and / or teamwork.	
13. Astronomical events of 2027	Description, explanation, conversation, individual study and / or teamwork.	
14. Exam preparation.	Description, explanation, conversation, individual study and / or teamwork.	
Bibliography 1. CUREA, I.: Atlas stelar descriptiv, Tipografia Universitatii Timisoara, 1970. 2. KARTUNEN, H., KROGER, P., OJA, H., POUTANEN, M., DONNER, K., J., - Fundamental Astronomy, Springer, Berlin, Heidelberg, 1994. 3. PAL A., POP V., URECHE V.: Astronomie, Culegere de probleme, Presa Universitara clujeana, Cluj-Napoca, 1998. 4. POP V., POP D.: Trigonometrie plana si trigonometrie sferica, Presa Universitara clujeana, Cluj-Napoca, 2003		

9. Evaluation

Type of activity	9.1 Evaluation criteria ⁴	9.2 Evaluation methods ⁵	9.3 Percentage in the final grade
9.4. Course	The completeness and correctness of the knowledge	Exam	3/5

⁴ The evaluation criteria must directly reflect the learning outcomes targeted at the level of the degree programme respectively at the level of the subject. More specifically, the learning outcomes set out in the expected learning outcomes are assessed.

⁵ Both final evaluation methods and ongoing evaluation strategies should be established.

	The degree of assimilation of the specialized language		
9.5. Seminar/ laboratory	The ability to use the assimilated knowledge in solving problems	Continuous evaluation of student participation in educational activities	2/5
	Analytical capacity, originality		
9.6 Minimum standard for passing			
The minimum passing grade is 5, for both course and seminar.			

10. SDG labels (Sustainable Development Goals)⁶

		Sustainable Development Generic Label						
								
								No label applies
								

Date of entry:
14.04.2026

Signature of course coordinator

Conf. dr. Cristina Blaga

Signature of seminar coordinator

Conf. dr. Cristina Blaga

Date of approval in the department:
...

Signature of the head of department

Prof. dr. Andrei Mărcu

⁶ Select a single label which, according to the [Implementation of SDG labels in the academic process](#), best matches the subject. If the subject addresses sustainable development in a generic manner (i.e. by presenting/introducing the general framework of sustainable development, etc.), then the Sustainable Development generic label may be applied. If none of the labels describe the subject, select the last option: "No label applies".