ASTROPHYSICS: 4-SEMESTER MASTER'S PROGRAM

STUDY PLAN
(for educational cycles from the academic year 2023/2024 on)

Year of study: I
1st Semester

Course	O/F[1]	Course form[2]				No. of class hours	Assessment method[3]	ECTS credits	Scientific disciplines to which the course is related
		W	K	L	S				
Astrophysics I	O	30	15			45	E/Z	5	physical sciences/astronomy
Computational Methods I	O	30		30		60	Z	6	physical sciences/astronomy
Data Analysis in Physics and Astronomy	O	15		30		45	Z	3	physical sciences/astronomy
Modern Trends in Astrophysics I[4] or Selected Topics in Astrophysics I[4]	O/F[4]	10				10	Z	1	physical sciences/astronomy
Astronomy-oriented study track[5]									
Introduction to Solar Physics	O/F[6]	15				15	Z	2	astronomy
Laboratory of Theoretical Astrophysics or Laboratory of Magnetic Activity of the Sun and Stars	O/F[6]			30		30	Z	3	physical sciences/astronomy
Physics-oriented study track[5]									
Advanced Statistical Physics	O/F[6]	30	30			60	E/Z	6	physical sciences
Elective Courses I[7]	F	course dependent						3[8]	physical sciences/astronomy
Laboratory of CCD Photometry	F			45		45	Z	4	astronomy
Advanced Topics of Stellar Structure and Evolution	F	30	30			60	E/Z	5	physical sciences/astronomy

Quantum Electrodynamics	F	30	30			60	E/Z	6	physical sciences
Monografic Lecture[9]	F	30				30	E	3	physical sciences/astronomy
Specialized Lecture[9]	F	30	30			60	E/Z	6	physical sciences/astronomy
Ethics in Research	O		24			24	Z	3	philosophy/law
English (B2+ level)	O		60			60	E	4	physical sciences/astronomy
Initial training on OHS and fire protection	O	e-learning				4	Z	–	n/a
Polish for Foreigners (A1 level)[10]	O[10]		30			30	–	–	n/a

[1] Character of the course: O – mandatory, F – elective.
[2] Course form: W – lecture, K – class/project, L – laboratory/practice, S – seminar.
[3] Assessment method: E – exam, Z – passing with grade.
[4] Modern Trends in Astrophysics I/II/III/IV and Selected Topics in Astrophysics I/II/III/IV consist of short lectures of a monographic type, mainly delivered by visiting Professors. Students can attend and pass them in every semester. During the studies, it is required to complete a total of four such courses.
[5] Students choose between two alternative study tracks: astronomy- or physics-oriented. Courses within the chosen track become mandatory for them.
[6] Courses mandatory within one study track become optional for students of the alternative study track.
[7] Elective courses offered in the 1st semester can be taken in the 3rd semester and vice versa, subject to course prerequisites.
[8] Student completes one or more optional courses for at least 3 ECTS credits in total. Excess ECTS credits gathered in this semester count towards the number of ECTS points required to be gained within elective courses in the next semester.
[9] The list of Monographic/Specialized Lectures will be updated every year to reflect the current fields of research going on at the Faculty. Monographic/Specialized Lectures might be offered with fewer class hours than indicated and correspondingly fewer assigned ECTS credits. Classes associated with Specialized Lecture may take a different form, adequate to the course topic.
[10] Polish course is obligatory for foreigners only, subject to separate University regulations. 5 ECTS credits gained for this course do not count towards the total of 120 ECTS credits required to complete the curriculum and get the degree. Total number of class hours in the semester does not include the Polish course.

Total number of ECTS credits in the 1st semester: 30 within the astronomy-oriented study track, 31 within the physics-oriented study track
Total number of class hours in the 1st semester: 325 within the astronomy-oriented study track, 340 within the physics-oriented study track

Year of study: I
2nd Semester

Course	O/F[1]	Course form[2]				No. of class hours	Assessment method[3]	ECTS credits	Scientific disciplines to which the course is related
		W	K	L	S				
Astrophysics II	O	30	15			45	E/Z	5	physical sciences/astronomy
Computational Methods II	O	30		30		60	Z	6	physical sciences/astronomy
Highlights of Modern Physics and Astrophysi*cs*	O				30	30	Z	3	physical sciences/astronomy
Modern Trends in Astrophysics II[4] or Selected Topics in Astrophysics II[4]	O/F[4]	10				10	Z	1	physical sciences/astronomy
Practical Astrophysics at Observatory[5]	O			15		15	Z	2	physical sciences/astronomy
Astronomy-oriented study track[6]									
Variable Stars	O/F[7]	30				30	E	3	astronomy
Advanced Solar Physics and Space Weather	O/F[7]	30	15			45	E/Z	4	astronomy
Physics-oriented study track[6]									
General Relativity and Gravitation	O/F[7]	30	30			60	E/Z	6	physical sciences
Elective Courses II[8]	F	course dependent						7[9]	physical sciences/astronomy
Laboratory of Stellar Spectroscopy	F			45		45	Z	4	astronomy
Galactic Astronomy	F	30	30			60	E/Z	5	astronomy
Theoretical and Observational Cosmology	F	30	30			60	E/Z	6	physical sciences/astronomy
Non-Equilibrium Statistical Physics	F	30				30	E	3	physical sciences

Machine Learning	F	30		30		60	Z	6	physical sciences/astronomy
Monografic Lecture[10]	F	30				30	E	3	physical sciences/astronomy
Specialized Lecture[10]	F	30	30			60	E/Z	6	physical sciences/astronomy
Polish for Foreigners (A1 level)[11]	O[11]		30			30	E	5	n/a

[1] Character of the course: O – mandatory, F – elective.
[2] Course form: W – lecture, K – class/project, L – laboratory/practice, S – seminar.
[3] Assessment method: E – exam, Z – passing with grade.
[4] Modern Trends in Astrophysics I/II/III/IV and Selected Topics in Astrophysics I/II/III/IV consist of short lectures of a monographic type, mainly delivered by visiting Professors. Students can attend and pass them in every semester. During the studies, it is required to complete a total of four such courses.
[5] Practical Astrophysics at Observatory consists of a one-week practice held in the Astronomical Observatory in Białków. Exact schedule during the semester will depend on weather conditions.
[6] Students choose between two alternative study tracks: astronomy- or physics-oriented. Courses within the chosen track become mandatory for them.
[7] Courses mandatory within one study track become optional for students of the alternative study track.
[8] Elective courses offered in the 2nd semester can be taken in the 4th semester and vice versa, subject to course prerequisites.
[9] Student completes optional courses for at least 7 ECTS credits in total, taking into account excess ECTS credits from the past semester. Excess ECTS credits gathered in this semester count towards the number of ECTS points required to be gained within elective courses in the next semester.
[10] The list of Monographic/Specialized Lectures will be updated every year to reflect the current fields of research going on at the Faculty. Monographic/Specialized Lectures might be offered with fewer class hours than indicated and correspondingly fewer assigned ECTS credits. Classes associated with Specialized Lecture may take a different form, adequate to the course topic.
[11] Polish course is obligatory for foreigners only, subject to separate University regulations. 5 ECTS credits gained for this course do not count towards the total of 120 ECTS credits required to complete the curriculum and get the degree. Total number of class hours in the semester does not include the Polish course.

Total number of ECTS credits in the 2nd semester: 31 within the astronomy-oriented study track, 30 within the physics-oriented study track
Total number of class hours in the 2nd semester: 308 within the astronomy-oriented study track, 293 within the physics-oriented study track

Year of study: II **3rd Semester**									
Course	O/F[1]	Course form[2]				No. of class hours	/Assessment method[3]	ECTS credits	Scientific disciplines to which the course is related
		W	K	L	S				
Modern Trends in Astrophysics III[4] or Selected Topics in Astrophysics III[4]	O/F[4]	10				10	Z	1	physical sciences/astronomy
Astronomy-oriented study track[5]									
Stellar Pulsations	O/F[6]	30	30			60	E/Z	5	astronomy
Physics-oriented study track[5]									
Astroparticle Physics	O/F[6]	30	30			60	E/Z	5	physical sciences/astronomy
Elective Courses III[7]	F	course dependent						13[8]	physical sciences/astronomy
Laboratory of Stellar Pusations	F			15		15	Z	2	astronomy
Planetary Systems and Astrobiology	F	30				30	E	3	astronomy
Advanced Topics of Stellar Atmospheres	F	30	30			60	E/Z	5	physical sciences/astronomy
Compact Stars	F	15	15			30	Z	3	physical sciences/astronomy
Relativistic Astrophysics	F	30	30			60	E/Z	6	physical sciences/astronomy
Advanced General Relativity	F	30	30			60	E/Z	6	physical sciences
Gravitational Waves	F	15		15		30	Z	3	physical sciences/astronomy
Monografic Lecture[9]	F	30				30	E	3	physical sciences/astronomy
Specialized Lecture[9]	F	30	30			60	E/Z	6	physical sciences/astronomy

Master's Seminar I	O				30	30	Z	2	physical sciences/astronomy
Master's Degree Project I[10]	O/F[10]					ND[10]	Z	8	physical sciences/astronomy

[1] Character of the course: O – mandatory, F – elective.
[2] Course form: W – lecture, K – class/project, L – laboratory/practice, S – seminar.
[3] Assessment method: E – exam, Z – passing with grade.
[4] Modern Trends in Astrophysics I/II/III/IV and Selected Topics in Astrophysics I/II/III/IV consist of short lectures of a monographic type, mainly delivered by visiting Professors. Students can attend and pass them in every semester. During the studies, it is required to complete a total of four such courses.
[5] Students choose between two alternative study tracks: astronomy- or physics-oriented. Courses within the chosen track become mandatory for them.
[6] Courses mandatory within one study track become optional for students of the alternative study track.
[7] Elective courses offered in the 3rd semester can be taken in the 1st semester and vice versa, subject to course prerequisites.
[8] Student completes optional courses for at least 13 ECTS credits in total, taking into account excess ECTS credits from the past semester. Excess ECTS credits gathered in this semester count towards the number of ECTS points required to be gained within elective courses in the next semester.
[9] The list of Monographic/Specialized Lectures will be updated every year to reflect the current fields of research going on at the Faculty. Monographic/Specialized Lectures might be offered with fewer class hours than indicated and correspondingly fewer assigned ECTS credits. Classes associated with Specialized Lecture may take a different form, adequate to the course topic.
[10] Upon choosing the topic of his/her Master thesis, the student carries out the Master's Degree Project I/II in one of the research groups at the Faculty. The total workload expected for this is 200 hours per semester, corresponding to 8 ECTS credits. The number of class hours is project-specific, and hence, remains udefined.

Total number of ECTS credits in the 3rd semester: 29
Total number of class hours in the 3rd semester: 232

Year of study: II **4th Semester**									
Course	O/F[1]	Course form[2]				No. of class hours	Assessment method[3]	ECTS credits	Scientific disciplines to which the course is related
		W	K	L	S				
Modern Trends in Astrophysics IV[4] or Selected Topics in Astrophysics IV[4]	O/F[4]	10				10	Z	1	physical sciences/astronomy
Elective Courses IV[5]	F	course dependent						13[6]	physical sciences/astronomy
Extragalactic Astronomy	F	30	30			60	E/Z	5	astronomy
Astero- and Helioseismology	F	15				15	Z	2	astronomy
High-energy Astrophysics	F	30	30			60	E/Z	5	physical sciences/astronomy
Computational Gravity	F	15		15		30	Z	3	physical sciences
Neutrino Physics	F	30				30	E	3	physical sciences
Monografic Lecture[7]	F	30				30	E	3	physical sciences/astronomy
Specialized Lecture[7]	F	30	30			60	E/Z	6	physical sciences/astronomy
Entrepreneurship and Intellectual Property Protection	O	15				15	Z	2	economics and finance/law
Master's Seminar II	O				30	30	Z	2	physical sciences/astronomy
Master's Degree Project II[8]	O/F[8]					ND[8]	Z	8	physical sciences/astronomy
Master Thesis and Master's Degree Examination[9]	O[9]					–	E	4	physical sciences/astronomy

[1] Character of the course: O – mandatory, F – elective.
[2] Course form: W – lecture, K – class/project, L – laboratory/practice, S – seminar.
[3] Assessment method: E – exam, Z – passing with grade.
[4] Modern Trends in Astrophysics I/II/III/IV and Selected Topics in Astrophysics I/II/III/IV consist of short lectures of a monographic type, mainly delivered by visiting Professors. Students can attend and pass them in every semester. During the studies, it is required to complete a total of four such courses.

[5] Elective courses offered in the 4th semester can be taken in the 2nd semester and vice versa, subject to course prerequisites.
[6] Student completes optional courses for at least 13 ECTS credits in total, taking into account excess ECTS credits from the past semester.
[7] The list of Monographic/Specialized Lectures will be updated every year to reflect the current fields of research going on at the Faculty. Monographic/Specialized Lectures might be offered with fewer class hours than indicated and correspondingly fewer assigned ECTS credits. Classes associated with Specialized Lecture may take a different form, adequate to the course topic.
[8] Upon choosing the topic of his/her Master thesis, the student carries out the Master's Degree Project I/II in one of the research groups at the Faculty. The total Workload expected for this is 200 hours per semester, corresponding to 8 ECTS credits. The number of class hours is project-specific, and hence, remains udefined.
[9] Includes writing and submitting a Master thesis on the previously selected topic, as well as passing the Master's degree exam.

Total number of ECTS credits in the 4th semester: 30
Total number of class hours in the 4th semester: 192