Basic Space Physics
- COURSE SYLLABUS

1.	**Course title:** *Basic Space Physics*	
2.	**Lecturer:** *Prof. dr hab. Jan Błęcki*	
3.	**Field, type and level of studies, year of study:** *Space plasma, magnetosphere, ionosphere, space weather, all years of study*	
4.	**Course character:** *monographic lecture*	
5.	**Teaching method:** *traditional or on-line*	
6.	**Language:**	*English*
7.	**Course type and number of hours:** *lecture, 36h*	
8.	**Estimated load of student's independent work:**	*20h*
9.	**Total workload and number of ECTS points:**	*56 h, 3 ECTS*
10.	**Short description and main focus of the course:** 1. *The Earth in the Solar System and in the Universe.* 2. *Earth's atmosphere –its structure and dynamics.* 3. *Plasma – definition and fundamental features.* 4. *The Sun –its structure, activity and Solar Wind.* 5. *Magnetic Field of the Earth.* 6. *The Ionosphere – origin, structure and variability.* 7. *Propagation of the electromagnetic waves in the ionosphere and influence of the disturbances in space on it.* 8. *The Magnetosphere – creation, structure and processes within it.* 9. *Disturbances in the near Earth space- their sources and physical processes responsible for their.* 10. *Overall picture of the Solar-Earth connection s- Space Weather.* 11. *Cosmic rays – basic information.* 12. *Influence of the disturbances in the space around Earth on the technical constructions in space and on the ground and on the people.*	
11.	**References:** *Wolfgang Baumjohann, Rudolf Treumann, Basic space plasma physics.* *May-Britt Kallenrode, Space Physics.Tamas I.Gombosi, Physics of the Space Environment.*	

12.	**Prerequisites:**	
	Good knowledge of physics and mathematics on University level	
13.	**Educational outcomes:**	**PQF level 8 codes:**
	Knowledge: *The student knows/is able to:* • *Explain the Earth's place in the Solar System and Universe and its significance for space physics.* • *Describe the structure and dynamics of the atmosphere, ionosphere, and magnetosphere.* • *Explain the Sun's structure, activity, and solar wind, and their influence on near-Earth space.* • *Define plasma and its fundamental role in space environments.* • *Summarize the origins and effects of space disturbances, cosmic rays, and space weather on Earth.*	*P8S_WG, P8S_WK*
	Practical Skills: *The student is able to* • *Analyze how electromagnetic waves propagate in the ionosphere and assess the impact of solar and geomagnetic disturbances on communication and navigation systems.* • *Apply fundamental space physics concepts to interpret space weather data and predict its potential technological effects.* • *Use simplified models to represent processes in the solar-terrestrial system (e.g., plasma behavior, magnetospheric dynamics).*	*P8S_UW, P8S_UK, P8S_UO*
	Social Skills: *The student is ready to:* • *Evaluate the societal importance of understanding space physics for protecting technology, infrastructure, and human health.* • *Develop critical thinking and scientific reasoning when discussing the impacts of solar-terrestrial interactions.* • *Collaborate in discussions on space-related challenges and their implications for sustainable use of space.*	*P8S_KK, P8S_KO, P8S_KR*
14.	**Evaluation of the educational outcomes:**	
	written exam,	
15.	**Criteria to complete the course:**	
	Presence on lecturs, final exam min.60% correct answers	
16.	**Contact with the lecturer:**	
	Email:jblecki@cbk.waw.pl, room 25.	