The physics of stars and the scattered matter - course description

General information

Course name	The physics of stars and the scattered matter
Course ID	13.7-WF-FizP-IPPOS- 17
Faculty	Faculty of Physics and Astronomy
Field of study	WFiA - oferta ERASMUS
Education profile	-
Level of studies	Erasmus programme
Beginning semester	winter term 2023/2024

Course information

Semester	2
ECTS credits to win	6
Available in specialities	Physics
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. Wojciech Lewandowski, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Class	30	2	-	-	Credit with grade
Lecture	30	2	-	-	Exam

Aim of the course

Consolidation and extension of the basic astrophysical ideas. Presentation of physical theories that are aplicable to astronomical problems, at the level required for basic understanding of the processes governing the structure and evolution of starts, and the properties of the interstellar medium.

Prerequisites

Basic knowledge of physics and astronomy.

Scope

- Basic physical laws and their application to astrophysical problems: gravitation, electrodynamics, thermodynamics, statistical physics, properties of the electromagnetic waves, special relativity.

- The basics of quantum mechanics. The structure of an atom. Nuclear physics, strong and weak interactions. Thermonuclear reactions.

- The structure of stars. Stellar energy sources. Radiation transfer. The basics of stellar atmosphere physics: origin of spectral lines.

- Basic problems of stellar evolution and its final stages: white dwarves, neutron stars, black holes.

- The basics of the interstellar medium physics: gaseous and dust clouds, radiative processes (thermal and non-thermal) in the interstellar medium.

Teaching methods

Classic lecture and computational exercises during class

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Student is able to name and describe the basic laws of gravity, electrodynamics, thermodynamics, statistical physics, electromagnetic radiation physics and special relativity. Student knows the basics of quantum mechanics at the level required to describe the structure of atoms and molecules, and atomic nuclei. Student can describe the qualitative properties on weak and strong interactions. He can name and describe the basic thermonuclear reactions happening in stars(the proton-proton cycle, the CNO cycle, 3-alpha reaction). Student knows, understands and is able to describe the basic physical laws governing the structure of stars. He can characterize the structures of stars of various masses, and explain what observational parameters will result from such structure. He can explain the origin of spectral lines, and describe how they can be used to ascertain the basic physical parameters of stars. Student has knowledge about the stellar evolution, and is able to explain how and why stars of different masses will evolve. He can name and describe the final stages of stellar evolution: white dwarves, neutron stars and black holes. He can name and explain the radiative processes applicable to the interstellar medium. He can name the types of various portions of the interstellar medium and point which physical processes are responsible for their observational parameters.		• an exam - oral, descriptive, test and other	• Lecture

Outcome description	Outcome symbols	Methods of verification	The class form
Based on the acquired knowledge student can perform simple calculations to solve basic astrophysics problems. He is able to interpret the results of simple astronomical observations, and on their basis infer the basic parameters of stars: mass, brightness, size and temperature. He is able to use his knowledge of astronomy to develop a simple observing project.		• a written assignment • an evaluation test	• Class

Assignment conditions

Lecture**:** Oral exam, passing condition – positive grade.

Class**:** written test – solving computational exercises; passing condition – positive grade.

Before taking the examination the student needs to obtain passing grade in the computational exercises.

Final grade: and average of the exam grade and the class grade

Recommended reading

[1] F. Shu, *Galaktyki, gwiazdy, życie*, Prószyński i S_ka, 2003.

[2] M. Kubiak, *Gwiazdy i materia międzygwiazdowa*, PWN, 1994.

[3] J.M. Kreiner, *Astronomia z astrofizyką*, PWN, 1988.

Further reading

[1] E. Rybka, *Astronomia ogólna*, PWN, 1983.

Notes

Modified by dr Marcin Kośmider (last modification: 06-02-2023 22:59)

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