# High-energy astrophysics - course description

## General information

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| Course name | High-energy astrophysics |
| Course ID | 13.7-WF-FizD-HEA-S17 |
| Faculty | Faculty of Physics and Astronomy |
| Field of study | Physics |
| Education profile | academic |
| Level of studies | Second-cycle studies leading to MS degree |
| Beginning semester | winter term 2021/2022 |

## Course information

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| Semester | 3 |
| ECTS credits to win | 2 |
| Available in specialities | Astrofizyka komputerowa |
| Course type | obligatory |
| Teaching language | english |
| Author of syllabus | |

## 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 |
|---|---|---|---|---|---|
| Lecture | 30 | 2 | - | - | Exam |

## Aim of the course

Consolidation and expansion of the basic concepts of high-energy astrophysics. Forward the message to enable the understanding of high-energy astrophysical processes.

## Prerequisites

Knowledge from the introduction to astrophysics, compact objects, Astrophysics I and II.

## Scope

- Special Theory of Relativity.
- Physics of fluids.
- Radial processes.
- Star supernovae.
- Neutron stars, pulsars and magnetars.
- Binary systems of compact objects.
- Gamma-ray bursts and gamma-ray burst afterglow.
- Active Galactic Nuclei.

## Teaching methods

Lecture with exercises conventional accounting.

## Learning outcomes and methods of theirs verification

| Outcome description | Outcome symbols | Methods of verification | The class form |
|---|---|---|---|
| Student can use the English-language literature. | • K2_U14<br>• K2_K01 | • an exam - oral, descriptive, test and other | • Lecture |
| Student is able to carry out the calculations for solving problems and issues high-energy astrophysics. Able to interpret astronomical observations carried out in the X-and gamma of the electromagnetic spectrum, and on this basis to estimate the most important physical parameters such as binary systems with a compact object as one of the ingredients. | • K2_U02<br>• K2_U03<br>• K2_U07 | • an exam - oral, descriptive, test and other | • Lecture |
| Student is able to use their knowledge to construct a simple research projects, as well as to present their knowledge in a popular science. | • K2_K05 | • an exam - oral, descriptive, test and other | • Lecture |
| The student knows and understands the course content. | • K2_W03<br>• K2_W04<br>• K2_W06 | • an exam - oral, descriptive, test and other | • Lecture |

## Assignment conditions

**Final grade:** Oral examination, Condition Assessment - a positive evaluation of the test.

## Recommended reading

[1] U. Kolb, *Extreme Environment Astrophysics*, Cambridge, 2010.

[2] S. Rossweg, M. Brueggen, *Introduction to High-Energy Astrophysics*, Cambridge, 2007.

[3] M. S. Longair, *High Energy Astrophysics*, Cambridge, 2011.

## Further reading

[1] M. Camenzind, *Compact objects in astrophysics*, Springer, 2007.

[2] W. H. G. Lewin, M. van der Klis, *Compact Stellar X-ray Sources*, Cambridge Uni. Press, 2006.

[3] F. Shu*, Galaktyki, gwiazdy, życie*, Prószyński i S-ka, 2003.

## Notes

Modified by dr Marcin Kośmider (last modification: 09-05-2021 21:41)