



COURSE UNIT (MODULE) DESCRIPTION

| Course unit (module) title | Code |
|--|------|
| Instruments and methods in astrospectroscopy | |

| Lecturer(s) | Department(s) where the course unit (module) is delivered |
|-------------------------------------|---|
| Coordinator: dr. Vidas Dobrovolskas | Faculty of Physics |
| Other(s): dr. Arūnas Kučinskas | |

| Study cycle | Type of the course unit (module) |
|-----------------|----------------------------------|
| Second (Master) | Optional |

| Mode of delivery | Period when the course unit (module) is delivered | Language(s) of instruction |
|------------------|---|----------------------------|
| Face-to-face | Semester 1 | Lithuanian/English |

| Requirements for students | |
|--------------------------------|-----------------------------------|
| Prerequisites: Astrophysics | Additional requirements (if any): |

| Course (module) volume in credits | Total student's workload | Contact hours | Self-study hours |
|-----------------------------------|--------------------------|---------------|------------------|
| 5 | 140 | 64 | 76 |

| Purpose of the course unit (module): programme competences to be developed | | |
|--|-----------------------------------|---|
| The purpose of this module is to get the student acquainted with different spectrographs, raw data reduction procedures and different spectroscopic databases, to investigate relations between observational data and theoretical models seeking to understand and explain processes taking place in stars. | | |
| Learning outcomes of the course unit (module) | Teaching and learning methods | Assessment methods |
| Ability to understand working principles of different spectrographs and their differences | Problem teaching, autonomous work | Assessment of laboratory work, written and oral examination |
| Ability to use modern spectroscopic databases for solution of astrophysical problems | Problem teaching, autonomous work | Assessment of laboratory work, written and oral examination |
| Ability to run independently all steps of spectroscopic data reduction and data preparation for scientific analysis | Problem teaching, autonomous work | Assessment of laboratory work, written and oral examination |

| Content: breakdown of the topics | Contact hours | | | | | | Self-study work: time and assignments | | |
|---|---------------|-----------|----------|-----------|-----------------|---------------------------|---------------------------------------|------------------|--------------------------------|
| | Lectures | Tutorials | Seminars | Exercises | Laboratory work | Internship/work placement | Contact hours | Self-study hours | Assignments |
| 1. Spectra as source of information about physical properties of different astronomical objects. | 4 | | | | 4 | | 8 | 8 | Preparation of laboratory work |
| 2. Modern UV-IR spectrographs. Echelle spectrographs. Multi-object spectrographs. Modern spectroscopic data archives. | 4 | | | | 16 | | 20 | 24 | Preparation of laboratory work |
| 3. Procedures of spectroscopic data reduction. | 4 | | | | 16 | | 20 | 24 | Preparation of laboratory work |
| 4. Methods of spectroscopic analysis of stellar atmospheres. | 4 | | | | 12 | | 16 | 20 | Preparation of laboratory work |
| Total | 16 | | | | 48 | | 64 | 76 | |

| Assessment strategy | Weight, % | Deadline | Assessment criteria |
|---------------------|-----------|---|--|
| Examination | 50 | During the exam session | Understanding of the main topics of the module |
| Laboratory work | 50 | Presentation during the final lecture of the module | Understanding of the main astrophysical phenomena, processes and their interaction which was discussed during laboratory work, understanding of a wider astrophysical context in relation to the module topic. |

| Author | Year of publication | Title | Issue of a periodical or volume of a publication | Publishing place and house or web link |
|---------------------------|---------------------|--|--|--|
| Compulsary reading | | | | |
| Gray, D.F. | 2005 | The Observation and Analysis of Stellar Photospheres | | Cambridge University Press |
| Optional reading | | | | |
| Appenzeller, I. | 2013 | Introduction to Astronomical Spectroscopy | | Cambridge University Press |