

## Synchrotron Radiation Research in Earth and Planetary Sciences (C002840)

Course size (nominal values; actual values may depend on programme)

|         |     |            |       |             |        |
|---------|-----|------------|-------|-------------|--------|
| Credits | 4.0 | Study time | 110 h | Contact hrs | 27.5 h |
|---------|-----|------------|-------|-------------|--------|

Course offerings and teaching methods in academic year 2018-2019

|                |         |         |        |
|----------------|---------|---------|--------|
| A (semester 2) | English | seminar | 20.0 h |
|                |         | lecture | 7.5 h  |

Lecturers in academic year 2018-2019

|                |      |                    |
|----------------|------|--------------------|
| Vincze, Laszlo | WE06 | lecturer-in-charge |
|----------------|------|--------------------|

Offered in the following programmes in 2018-2019

|                                                    |       |          |
|----------------------------------------------------|-------|----------|
| <a href="#">Master of Science in Space Studies</a> | crdts | offering |
|                                                    | 4     | A        |

Teaching languages

English

Keywords

Synchrotron radiation, XRF, XRD, XAFS

Position of the course

The course provides a detailed overview of synchrotron radiation based spectroscopic techniques used by earth and planetary scientists.

Contents

- X-ray fluorescence microprobe analysis
- X-ray absorption fine structure (XAFS) spectroscopy
- absorption, phase-contrast and X-ray fluorescence microtomography
- powder, single crystal and interface diffraction
- high-pressure/high-temperature crystallography and spectroscopy using diamond anvil cells;

Next to the detailed discussion on the properties and applications of synchrotron radiation, the course will provide a detailed overview on the above techniques and will summarize some of the recent research associated with their applications. Examples will include synchrotron radiation based chemical/structural analysis of (a) inclusions in natural superdeep diamonds, (b) interplanetary dust particles, (c) micro-meteorites and (d) cometary matter returned by NASA's Stardust mission.

Initial competences

Having followed successfully a course on basic spectroscopic methods of chemical analysis.

Final competences

- 1 Knowledge on the properties of synchrotron radiation sources.
- 2 Detailed knowledge on the interaction types of X-rays with matter, relevant for XRF/XANES/EXAFS spectroscopy.
- 3 Knowledge on the principles of synchrotron radiation micro-XRF, XRF microtomography and XANES/EXAFS/XRD methods; they can describe the respective instrumentations and are aware of possible applications of these techniques in Earth and Planetary science.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, seminar

Learning materials and price

- English syllabus, estimated cost 12 €

References

Course content-related study coaching

Evaluation methods

end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period

Written examination

Examination methods in case of periodic evaluation during the second examination period

Written examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Calculation of the examination mark

Written exam counts for 100 %.