

Course description

Course abbreviation:	KCH/SEMIP	Page:	1 / 3
Course name:	Light and Electron Microscopy		
Academic Year:	2016/2017	Printed:	20.01.2018 15:48

Department/Unit /	KCH / SEMIP	Academic Year	2016/2017
Title	Light and Electron Microscopy	Type of completion	Exam
Accredited/Credits	Yes, 4 Cred.	Type of completion	Oral
Number of hours	Přednáška 2 [Hours/Week]		
Occ/max	Status A Status B Status C	Course credit prior to	NO
Summer semester	0 / - 0 / - 0 / -	Counted into average	YES
Winter semester	64 / - 0 / - 0 / 2	Min. (B+C) students	not determined
Timetable	Yes	Repeated registration	NO
Language of instruction	Czech	Semester taught	Winter semester
Substituted course	KFY/SEMIP	Internship duration	0
Preclusive courses	N/A		
Prerequisite	N/A		
Informally recommended courses	N/A		
Courses depending on this Course	KFY/MIMET, KFY/SEMIC, KFY/SEMIS, KFY/ZSEMC, KFY/7ZEMC		

Course objectives:

Methods of light and electron microscopy with emphasis on physical principles, display theory, imaging methods, basic knowledge of construction and preparation of chemicals. Use of microscopic techniques for analysis of surface characteristics of solids.

Requirements on student

Evaluation of the subject as well as the exam grading is made according to the articles No 31 - 33 in the Regulations on Study and Examinations University of Ostrava

Content

Methods of light and electron microscopy with emphasis on physical principles, display theory, imaging methods, basic knowledge of construction and preparation. Use of microscopic techniques for analysis of surface characteristics of solids.

Time schedule

I. Light microscopy

1. Introduction. Fundamentals of physical optics. Converging and diverging lenses, lens defects.
2. Optical system of a microscope. Magnification, resolution, numerical aperture, depth of acuity.
3. Construction, types of microscopes. Objectives, eyepieces, illuminating system.
4. Imaging methods. Bright and dark field in transmigrant and incident light. Phase contrast method. Polarization microscopy.
5. Measurement with a microscope. Measurement of lengths, depth and breadths. Structure calculation.
6. Aids for microscoping. Microscoping procedure. Classification of preparations.
7. Preparation of a microscopic preparation (fixation, cutting, colouring, fitting).

II. Electron microscopy

8. Physical fundamentals. Interaction electron - solid.
9. Fundamentals of electron optics. Electrostatic and electromagnetic lenses. Lens defects. Resolution and depth of acuity.
10. Transmission electron microscope (TEM). Construction, operating modes, operation.
11. Scanning electron microscope (SEM). Construction, operating modes, operation.
12. Preparation of chemicals for TEM (fixation, cutting, contrasting).
13. Preparation of chemicals for REM (fixation, dewatering, metal coating).

Prerequisites - other information about course preconditions

Competences acquired

The student knows methods of light and electron microscopy with stress on physical principles, display theory, imaging methods, basic knowledge of construction and preparation of chemicals.

Fields of study**Guarantors and lecturers**

- **Guarantors:** doc. RNDr. Jiří Kalina, Ph.D.
- **Lecturer:** doc. RNDr. Jiří Kalina, Ph.D.

Literature

- **Basic:** NAUŠ, J. *Experimentální metody biofyziky I. 1. vyd. 129 s.* Olomouc: UP Olomouc, 1985.
- **Basic:** KUBÍNEK, R. *Experimentální metody biofyziky. 1. vyd. 49 s.* Olomouc: UP Olomouc, 1989.
- **Basic:** High-Magnification Stereoscropy - http://www.funsci.com/fun3_en/hmster/hmster_en.htm >
- **Basic:** <http://ceg.fsv.cvut.cz/CZ/ceg-vyzkum/mikroskopie.htm> - <http://ceg.fsv.cvut.cz/CZ/ceg-vyzkum/mikroskopie.htm> >
- **Basic:** <http://encyklopedie.seznam.cz/heslo/139109-mikroskopie-atomarnich-sil> - <http://encyklopedie.seznam.cz/heslo/139109-mikroskopie-atomarnich-sil> >
- **Basic:** http://www.funsci.com/fun3_en/usph/usph.htm - http://www.funsci.com/fun3_en/usph/usph.htm >
- **Basic:** http://www.funsci.com/texts/index_en.htm - http://www.funsci.com/texts/index_en.htm >
- **Basic:** <http://www.matexpm.com/lext.htm> - <http://www.matexpm.com/lext.htm> >
- **Basic:** <http://www.paru.cas.cz/lem/book/> - <http://www.paru.cas.cz/lem/book/> >
- **Basic:** http://www.vscht.cz/sls/vyzkum/metody/polarizacni_mikroskopie.htm - http://www.vscht.cz/sls/vyzkum/metody/polarizacni_mikroskopie.htm >
- **Extending:** SMĚKAL, P. *Experimentální metody biofyziky II. Světelná a elektronová mikroskopie. 1. vyd. 220 s.* Ostrava: Ostravská univerzita, 1995. ISBN 80-7042-723-X.
- **Recommended:** PROSSER, V. et al. *Experimentální metody biofyziky. 1. vyd. 716 s.* Praha: Academia, 1989. ISBN 80-200-0059-3.
- **Recommended:** MALÍNSKÝ, J. *Přehled histologické techniky. 1. vyd. 46 s.* Olomouc: UP Olomouc, 1985.

Time requirements

Activities	Time requirements for activity [h]
Being present in classes	26
Self-tutoring	26
Scientific text studying in a foreign language	13
Consultation of work with the teacher/tutor (incl. electronic)	5
Preparation for an exam	16
Total:	86

assessment methods**professional knowledge**

Oral examination

teaching methods**professional knowledge**

Demonstration

Monologic (explanation, lecture, briefing)

Working with text (coursebook, book)

learning outcomes

professional knowledge - knowledge resulting from the course:

The student knows methods of light and electron microscopy with stress on physical principles, display theory, imaging methods, basic knowledge of construction and preparation of chemicals.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Applied Physics	Bachelor	Full-time	Biophysics	1	2014	2016	Povinné předměty	A	2	ZS
Applied Physics	Bachelor	Full-time	Biophysics	1	2012	2016	Povinné předměty	A	2	ZS
Biology	Bachelor	Full-time	Experimental Biology	1	2	2016	Povinné předměty	A	2	ZS
Chemistry	Postgraduate Master	Full-time	Analytical Chemistry of Solid Phase	1	2013	2016	Povinné předměty	A	2	ZS
Specialization in Health Service	Bachelor	Full-time	Health Laboratory Assistant	1	1	2016	Povinné předměty	A	2	ZS
Biology	Postgraduate Master	Full-time	Systematic Biology and Ecology	1	2012	2016	Povinně volitelné předměty	B	1	ZS