REQUIREMENTS

Semmelweis University, Faculty of Dentristry
Name(s) of the Institute(s) teaching the subject:
Department of Genetics, Cell- and Immunobiology Semmelweis University, Faculty of Medicine

Name of the subject: Cell Science

Credits: 3

Total number of hours: 42 lectures: 14 practices: 28 seminars: 0

Type of the course (mandatory/elective): mandatory

Academic year: 2019/2020

Code of the course[1]: FOKGEN225_1A

Course director (tutor): Dr Kőhidai László

Contact details: Department of Genetics, Cell- and Immunobiology Semmelweis University, Faculty of Medicine

Position: Associate Professor

Date of habilitation and reference number: Budapest**,** 2004.06.16. Number: 214

Aim of the subject and its place in the curriculum:
Course Cell Science is developed for students of dentistry as a part of the Basic Module. The Curse presents the most important aspects of cell-morphology and cell function. Cell Science Course provides a detailed discussion of compartmentalization in the eukaryotic cell as well as describes the most significant characteristics of the basic cellular functions (migration, endocytosis, cell-cell communication, division, stem cell differentiation, ageing and cell death). The practices introduce the students to the microscopic techniques used for cell morphological studies. The purpose of the course is to demonstrate the complexity of cell structure and function relationships as well as to present basic methods of *in vitro* cell culturing and their potential medical applications.

Location of the course (lecture hall, practice room, etc.):
EOK Building Békésy Lecture Hall 1094 Budapest, Tűzoltó u. 37-47.
NET building: Lab rooms L13-L16 1089 Budapest, Nagyvárad tér 4.

Competencies gained upon the successful completion of the subject:
Knowledge of cell morphology, assignment of major cellular functions to organelles**.**
Usage of light microscope (bright field) for studying biological samples.
Knowledge of other microscopic techniques (fluorescence microscopy; super-resolution microscopy).
Knowledge of basic biological sample preparation techniques (section, smear, monolayer, suspension).
Ability to evaluate immune fluorescence images.
Ability to recognize cellular organelles and macromolecular complexes and sample preparation methods on electron micrographs. Interpretation of co-localization of cellular organelles.

Prerequisite(s) for admission to the subject:
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Minimum and maximum number of students registering for the course:
Student selection method in case of oversubscription: no selection

How to register for the course:
through NEPTUN system

Detailed thematic of the course[2]:

Lectures:

1. Cell theory. Model cells in Medicine
2. Cell membrane
3. Structure and function of the nucleus
4. Endoplasmic reticulum
5. Golgi complex, vesicular transport and secretion
6. Endocytosis. Autophagy
7. Cell adhesion and cell junctions
8. Cytoskeleton
9. Cellular movement
10. Structure and function of mitochondria and peroxisomes
11. Cell communication. Extracellular vesicles.
12. Cell cycle and mitosis
13. Stem cells and differentiation
14. Cellular aging and cell death

Practices:

1. The light microscope
2. The general cell structure. Light microscopic microtechnique
3. The electron microscope. Cell membrane
4. The interphase nucleus. Cyto/Histo-chemistry
5. Immunohistochemistry. Super-resolution microscopy
6. Cell and tissue culture
7. Endoplasmic reticulum
8. Golgi complex and secretion
9. Endocytosis and lysosomes
10. Cell surface differentiation, enzyme-histochemistry
11. Midterm. Store and supply of energy. Mitochondria. Peroxisome.
12. Mitosis
13. Meiosis
14. Cell death (necrosis and apoptosis)

The order of topics may vary

Lecturers: Dr László Kőhidai, Prof Edit Buzás, Dr. András Kristóf Fülöp, Dr. Sára Tóth
Practice teachers: teaching staff of the Department of Genetics, Cell and Immunobiology.

Potential overlap(s) with other subjects:

There is no substantial overlap with other subjects, but some subject e. g. Histology I, Molecular cell biology and Biophysics is partly based on the knowledge of cell morphology and cellular functions

Special training activities required[3]:

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Policy regarding the attendance and making up absences:

The classes can be only attended in an appropriate mental and health condition. There is a possibility to make up for absences during the current school week after prior consultation with practical teachers.

Means of assessing the students' progress during the semester[4]:

e ability of setting a light microscope for sample examination is controlled by the practice teacher.

Requirement for acknowledging the semester (signature):

According to the Study and Examination Policy 17§ 7.: 75% practice class attendance, and attendance on midterm is required for signature.

Type of the examination:
written

Exam requirements[5]:

Theoretical part
The structure of the cell membrane
Function of the cell membrane
Extension of the cell membrane glycocalyx, membrane skeleton
The nucleus I: the chromatin
The nucleus II: the nucleolus
The nucleus III: interchromatin
The nucleus IV: nuclear envelop and pore
Rough endoplasmic reticulum
Smooth endoplasmic reticulum
Golgi-complex
Vesicular transport
Secretion
Endocytosis
Cellular digestion and metabolism
Autophagy
Cellular interactions.
Cell adhesion
Cytoskeleton
Cellular locomotion
The mitochondrium
The peroxisome
Cellular aging
Cell death
Stem cells
Cellular differentiation
cell-cell communication: endocrine, paracrine-autocrine
Cell communication by extracellular vesicles
Cell cycle
The mitosis
The meiosis
Practical part
The light microscope
The light microscopic microtechniques
The electronmicroscopy
The electronmicroscopic microtechniques
Histological staining and cytochemical reaction
Immunocytochemistry
Super-resolution microscopy
Cell culturing
Artificial tissues – basics of regenerative medicine
Recognition and evaluation of the light-microscopic slides studied during the semester
Recognition of cellular organelles and sample preparation techniques in electromicrographes

Type and method of grading[6]: The written exam score should achieve 50% of the total scores for passing.
How to register for the exam: Signing up and modification of the exam days can be arranged exclusively online in the students' registration system Neptun.
Opportunities to retake the exam: According to the Study and Examination Policy.
Literature, i.e. printed, electronic and online notes, textbooks, tutorials (URL for online material): Alberts et al.: Essential Cell Biology. Garland Science/Taylor & Francis Group Publ. 2013. (4th or 5th edition, ISBN: 9780815344544) Presentations and documents are available at the website of the Department (http://gsi.semmelweis.hu/index.php/en/education)
Signature of the tutor:
Signature(s) of the head(s) of the Institute(s):
Date: **26.09.2019**

Credit Transfer Committee's opinion:
Comment of the Dean's Office:
Signature of the Dean:

[1] Dékáni Hivatal tölti ki, jóváhagyást követően.
[2] Az elméleti és gyakorlati oktatást órákra (hetekre) lebontva, sorszámozva külön-külön kell megadni, az előadók és a gyakorlati oktatók nevének feltüntetésével. Mellékletben nem csatolható!
[3] Pl. terepgyakorlat, kórlapelemzés, felmérés készítése stb.
[4] Pl. házi feladat, beszámoló, zárthelyi stb. témaköre és időpontja, pótlásuk és javításuk lehetősége.
[5] Elméleti vizsga esetén kérjük a tételsor megadását, gyakorlati vizsga esetén a vizsgáztatás témakörét és módját.
[6] Az elméleti és gyakorlati vizsga beszámításának módja. Az évközi számonkérések eredményeink beszámítási módja.