

Course Syllabus

I. General Information

Course name	Cell signalling networks
Programme	Bioanalytical Technologies
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	MSc
Form of studies (full-time, part-time)	Full-time
Discipline	Biological sciences
Language of instruction	English

Course coordinator/person responsible	Asst. Prof.Dr. Mirza Suljagic
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	30	III	6
tutorial			
classes	30	III	

Course pre-requisites	Principles of Molecular Biology, Biochemistry, Genetics, Molecular Biology Techniques
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II. Course Objectives

C1- Identify the basic principles of intracellular signalling networks
C2- Identify the important parameters in the design of a quality system for molecular analyses
C3- Analysis of key signalling regulatory pathways, cell cycle control mechanisms
C4- Identify the main parameters in the biology of cancer occurrence.
C5- Use critical thinking skills to troubleshoot problems as they occur and determine possible causes

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	Explore the fundamental principles of molecular methods and their implications in intracellular molecular signalling, as well as disease occurrence.	K_W05
W_02	Knows the fundamental principles, methodology, and the application of molecular methods in intracellular protein networks.	K_W08
W_03	The students are exposed to aspects of statistics, quality control, regulatory issues and applications of these methods to the diagnosis and prognosis oh human disease.	K_W04

SKILLS		
U_01	The student follows and apply related protocols and tools in pre-clinical research settings.	K_U11
U_02	Comprehend current laboratory diagnostic approaches through applying biochemical and molecular biology principles.	K_U01
U_03	Utilize tools used in clinical research with biomedical applications on different level of genetic information.	K_U08
U_04	Is able to recognize the importance of strong work ethics, persistence and intellectual integrity	K_U10
SOCIAL COMPETENCIES		
K_01	Understands step-by-step the important role of good laboratory and clinical practice.	K_K03
K_02	Successfully develop plans and implement them; evolve to successfully incorporate to new working environments.	K_K01
K_03	Is ready to work as a team member, be responsible, confident, independent and able to actively participate in all discussions and tasks.	K_K06

IV. Course Content

Week 1: Presentation of the Syllabus - Introduction of the Course	
Week 2: Organelles of the Eukaryotic cell	
Week 3: Visualizing, Fractionating and Culturing Cells ; Light microscopy, Electron microscopy, Purification of Organelles, Isolation and culturing the cells	
Week 4: Biomembrane structure: Lipid composition, structural organization, protein components	
Week 5: Moving proteins into Membranes and Organelles	QUIZ1
Week 6: Molecular mechanisms of vesicular trafficking and endocytosis	
Week 7: Signal transduction and cellular responses: Cell surface receptors and components of intracellular signal transduction pathways	
Week 8: G protein-coupled receptors, cAMP and PKA, second messengers	
Week 9: Receptor tyrosine kinases, Ras/MAP pathway, PI3/Akt pathway	
Week 10: Regulating the Eukaryotic Cell Cycle: CDKs and cell-cycle control	
Week 11: Regulating the Eukaryotic Cell Cycle: Checkpoints in Cell cycle regulation	
Week 12: Cell Birth, Lineage and Death: Stem cells and differentiation	QUIZ2
Week 13: Cell Birth, Lineage and Death: Cell Death and its regulation	

Week 14: Cancer: Tumor cells and Genetic basis of cancer

Week 15 COURSE Overview

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods (choose from the list)	Forms of assessment (choose from the list)	Documentation type (choose from the list)
KNOWLEDGE			
W_01	Conventional lecture/Discussion	Written test	Evaluated written test/test
W_02	Conventional lecture/Discussion	Written test	Evaluated written test/test
W_03	Conventional lecture/Discussion	Written test	Evaluated written test/test
SKILLS			
U_01	Laboratory classes	Observation and Report	Report printout
U_02	Laboratory classes	Test of practical skills	Rating card
U_03	Practical classes	Test of practical skills	Rating card
U_04	Laboratory classes	Report	Report printout
COMPETENCIES			
K_01	Laboratory classes	Observation	Observation report
K_02	Laboratory classes	Observation	Observation report
K_03	Laboratory classes	Observation	Observation report

VI. Grading criteria, weighting factors, student workload

Written test to pass the lecture: 100%

Laboratory classes:

75% grades from written tests

10% reports/journal club

15% practical skills

Mark	Evaluation criteria	
Very good (5)	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 95-100%

overgood (4.5)	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 85-94 %
Good (4)	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 75-84%
Quite good (3.5)	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 65-74%
sufficient (3)	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 51-64%
insufficient (2)	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 51%

Form of activity	Number of hours
Number of contact hours (with the teacher)	70 (60 + 10 individual consultation)
Number of hours of individual student work	80

VII. Literature

Basic literature
1. Cellular Signal Processing: An Introduction to the Molecular Mechanisms of Signal Transduction 2nd ed
2. Lodish, Berk, Kaiser, Krieger, Scott, Bretscher. Ploegh and Darnell. (2008) Molecular Cell Biology, 6th Edition by W. H. Freeman and Company, New York, USA
Additional literature
1. The World of the Cell by Hardin, Bertoni, Kleinsmith (PEARSON) (2012)