

# MOLECULAR and CELLULAR PHYSIOLOGY (MCP) 2017/2018

<http://moodle.pmf.uns.ac.rs/course/view.php?id=43>; <http://www.dbe.uns.ac.rs/en/nauka-eng/lars>;

Questions and/or consultations: please send an e-mail for appointment ☺

## LECTURES

Silvana Andric, PhD, full professor (room 17 III floor DBE PMF; [silvana.andric@dbe.uns.ac.rs](mailto:silvana.andric@dbe.uns.ac.rs))

## LABORATORY PRACTICE

Silvana Andric, PhD, full professor (room 17 III floor DBE PMF; [silvana.andric@dbe.uns.ac.rs](mailto:silvana.andric@dbe.uns.ac.rs))

Isidora Starovlah, MSc, assistant (rooms 18 & 20 III floor DBE PMF; [isidora.starovlah@dbe.uns.ac.rs](mailto:isidora.starovlah@dbe.uns.ac.rs))

Sava Radovic, MSc, research-associate (rooms 18 & 20 III floor DBE PMF; [sava.radovic@dbe.uns.ac.rs](mailto:sava.radovic@dbe.uns.ac.rs))

## THE AIM OF THE COURSE:

The main goal of physiology in post-genomic era is to understand how thousands of coding proteins very nicely and coordinately allows precise regulation of cells and tissues behaviors to maintain homeostasis. Accordingly, goal of the course is to help students to acquire knowledge about basic principles of molecular and cellular physiology, types of ion channels, endocytosis, exocytosis, mitochondrial dynamic, basics of molecular physiology of stem cells (embryonic and adult) and induced pluripotent cells, as well as specialized cells of some of the physiological systems.

## THE OUTCOME OF THE COURSE:

At the end of the course students should be able to describe: basic principles of molecular and cellular physiology (ex. Ca<sup>2+</sup> signalosome), types of ion channels, endocytosis, exocytosis, mitochondrial dynamic (mitochondrial fusion, mitochondrial fission, mitophagy, mitochondrial biogenesis), basics of molecular physiology of stem cells (embryonic and adult) and induced pluripotent cells, as well as specialized cells of some of the physiological systems.

## ORGANIZATION OF THE COURSE (lectures, laboratory practice, oral exam)

**(1) LECTURES/Serbian-predavanja.** Presentations of the lectures, books, useful links and other materials are posted on Moodle PMF UNS. (<http://moodle.pmf.uns.ac.rs/course/view.php?id=43>)

**(2) LABORATORY PRACTICE/Serbian-vezbe (7 experimental laboratory classes; max 35 points, min 21 points) - REQUIRED ACTIVITY.**

All laboratory practices will be experimental (<http://moodle.pmf.uns.ac.rs/course/view.php?id=43>). At the end of each laboratory practice class, the knowledge acquired during that particular class will be test with mini-discussion covering the subject practiced on that particular class, as well as basic terms covered on previous lecture. For each mini-discussion minimal requirement is 60% of maximum. Requirement to attend oral exam is 21 from 7 laboratory practices.

**(3) ORAL EXAM (max 85 points) - REQUIRED ACTIVITY.**

Pre-request for oral exam are min 21 points from laboratory practice.

**!!!IMPORTANT ADVICE: It is most efficient to attend oral exam soon after passing the mini-discussions.**

## GRADING

Base for final mark:

**(2) Laboratory practice – up to 35 points**

**(3) Oral exam – up 85 points**

**51 – 60 points -> mark 6**

**61 – 70 points -> mark 7**

**71 – 80 points -> mark 8**

**81 – 90 points -> mark 9**

**91 – 100 points -> mark 10**

**IMPORTANT!!!** In order to improve course and our performances, we will appreciate very much all critiques, comments, suggestions, opinions and all will be more than welcomed ☺.

**LECTURES**  
(WEDNESDAY 9h - 12h, A3, DBE, PMF)

	DATE	SUBJECT OF THE LECTURE
1	18. X	Organization of the course Molecular and cellular physiology (MCP).
2	25. X	Basic principles of molecular and cellular physiology.
3	01. XI	Molecular physiology and regulation of ion channels.
4	08. XI	Role of Ca <sup>2+</sup> in regulation of cellular function. Vesicular trafficking: molecular base of endocytosis and exocytosis.
5	15. XI	Mitochondrial dynamic: mitochondrial movement, mitochondrial fusion and fision.
6	22. XI	Mitochondrial dynamic: mitophagy and mitochondrial biogenesis.
7	29. XI	Basic molecular physiology of stem cells (ESCs, ASCs) and induced pluripotent cells (iPCs).
8	06. XII	Molecular physiology of specialized neural cells and synapses. Molecular basis of biological clock.
9	13. XII	Basic molecular physiology of specialized sensory and cells from senses.
10	20. XII	Molecular physiology and adaptations of skeletal, heart and smooth muscle cells.
11	27. XII	Molecular physiology of specialized responsible for mammalian reproduction.
12	03. I	REPETIOTIONS OF THE SPECIFIC SUBJECTS ☺.

**LABORATORY PRACTICE**

MONDAY: 8<sup>00</sup>-11<sup>00</sup> (I group), V3 I floor DBE PMF UNS

E – experimental, T – theoretical

	DATE	SUBJECT OF THE PRACTICE
1	06. XI	Yeast as a model-system to study molecular and cellular physiology (E).
2	13. XI	Measurement of mitochondrial membrane potential of different immortalized cell lines (E).
3	20. XI	Measurement of mitochondrial biogenesis by using Mito-Track assay (E).
4	27. XI	Cre-Lox knock-out technology (T). Labeling and genotyping of knock-out mice (E).
5	04. XII	Isolation of adult stem cells from bone marrow of femur from Cre-/Cre+; <i>Cyp11a1, Insr/Igf1r</i> knock-out mice (E).
6	11. XII	Activation and inhibition of NOS in different immortalized cell lines (E).
7	18. XII	Isolation of spermatozoa and assessment of their functionality (E).
8	25. XII	REPETIOTIONS OF THE SPECIFIC SUBJECTS ☺.
9	08. I	REPETIOTIONS OF THE SPECIFIC SUBJECTS ☺.

**RECOMMENDATION FOR READING**

Presentations of the lectures, books, useful links and other materials are posted on Moodle PMF UNS.

(<http://moodle.pmf.uns.ac.rs/course/view.php?id=43>)

Berridge MJ (2012) Cell Signalling Biology (<http://moodle.pmf.uns.ac.rs/course/view.php?id=43>)

Alberts B, Johnson A, Lewis J, Raff M, Roberts K & Walter P (2002): *Molecular Biology of the Cell 4ed with CD*. Garland Science.

Lodish H, Berk A, Matsudaira P, Kaiser CA, Krieger M, Scott MP, Zipursky LS & Darnell J (2004):

*Molecular Cell Biology*. WH Freeman and Company.

Wilson J & Hunt T (2002): *Molecular Biology of the Cell Problems Approach Book 4<sup>th</sup>ed*. Garland Science.