

# EPIGENETIKA MB150P85

- advanced course for M.Sc. and PhD students (**winter 2008 course will be taught in English**)
- signing up for the course is HIGHLY RECOMMENDED after completing bachelor studies.
- 2x 1.5 hour lecture takes place once in two weeks from 9:00 to 12:00 in the new building of ÚMG in Krč (line 193 end-station) in the seminar room on the 1st floor.
- **the first lecture will take place on 7.10. 2007**
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7.10.	<b>Introduction</b> - overview of the course, basic concepts of epigenetic marks, diversity of epigenetic mechanisms and effects
	<b>Histone modification I</b> - concept of chromatin structure. Heterochromatin and euchromatin. Core histones, linker histones, replacement histones, protamines. Methods for studying chromatin.
	<b>Histone modification II</b> - histone modifications, polycomb proteins, acetylation, fosforylation and histone methylations, effects on gene expression.
21.10.	<b>DNA methylation I</b> - molecular basis of DNA methylation. CpG and non-CpG methylation. Adenosin methylation. Methods for studying DNA methylation. Bisulfite sequencing.
	<b>DNA methylation II</b> - effects of DNA methylation on gene expression, Methyl-binding proteins and mechanisms of inhibition of gene expression, distribution of DNA methylation within genes and mammalian genomes.
4.11.	<b>Imprinting</b> - concept of imprinting, mammalian imprinting. Molecular mechanisms of imprinting. Role of imprinting, Battle of the sexes.
	<b>X-inactivation</b> - principles and different strategies for dosage compensation. Control of X-inactivation in mammals.
25.11	<b>Epigenetic reprogramming in mammalian life-cycle</b> - integration of epigenetic modification in the mammalian life cycle. Reprogramming of gene expression during development, artificial reprogramming – the traditional view.
	<b>Epigenetic mechanisms found in other model systems (plants, yeasts, invertebrates ...)</b> - selected epigenetic mechanisms controlling genome integrity and gene expression
2.12	<b>RNA silencing I – molecular machines for RNA silencing</b> - “historical” introduction into RNA silencing. Post-transcriptional effects. Roles and effects of dsRNA. Proteins and complexes in RNA silencing.
	<b>RNA silencing II - RNAi technology</b> - experimental and therapeutic use. Design of RNAi experiments
16.12	<b>RNA silencing III – roles of RNA silencing pathways</b> - miRNA pathway, chromatin connection.
	<b>Integrated view of regulation of gene expression</b> - establishment of pluripotency in ES cells and embryos

Students are expected to actively participate during the course.

The final exam has the form of a take-home problem set to be individually solved in two weeks. In addition, undergraduate students will be asked to write a ~1000 word mini-review on a selected topic and PhD students will write an application for a long term fellowship for studying a selected problem. Students will have three months to complete these tasks. It's more work, sure.... whatever ... good scientists need these skills and this is one of the rare chances to practice them at school.