

Study programme: PhD in Biology			
Level: Doctoral degree			
Course title: NETWORKS OF SIGNALING PATHWAYS IN REPRODUCTION			
Lecturers: Prof. Dr Tatjana Kostic, Prof. Dr Silvana Andric			
Status: Elective			
ECTS: 15			
Requirements: -			
Learning objectives Objective of this course is to to acquire knowledge about networks of signaling pathways and their interactions in the regulation and synchronization of reproductive function. Students should gain the ability in scientifically based interpretation of experimental data in the field of signal transduction networks in reproduction.			
Learning outcomes At the end of this course students will be able to understand and describe the general features of the intracellular signaling pathways and method of network detection, transduction, transmission, propagation and amplification of information in order to achieve adequate reproductive biological response, as well as to acquire the capacity for analysis and discussion of scientific papers in the field cell signaling in reproduction.			
Syllabus <i>Theoretical instruction</i> Overview of types of cellular communication and signal transduction pathways in reproduction. Network of signaling pathways activated reproductive messengers. Signaling pathways and sexuality. Signaling pathways involved in sex determination. Network of signaling pathways that regulate the development of the ovaries and testes. Network of signaling pathways in the regulation of biosynthesis of female sex hormones and oogenesis. Network of signaling pathways in the regulation of biosynthesis of the male sex hormones and spermatogenesis. Signaling pathways activated during puberty and maturation of the hypothalamic-pituitary-gonadal axis. Network of signaling pathways that include estrogens, androgens and progesterone. Signaling in coitus and fertilization. Signaling pathways in implantation and placental formation. Signaling networks during pregnancy, preparing the fetus for birth, childbirth and lactation. Signaling pathways during reproductive aging and the menopause and andropause. <i>Practical instruction – Students research work</i> Each student will have an individual project assignment in the research related to the signaling network in the theca/granulosa cells of females and Leydig cells of males. The different <i>in vivo</i> experimental models will be used: pubertal and adults male and female laboratory rats; hypogonadal-hypogonadism; androgenization; superovulation; castration; "knock-out" mice (Insr/Igf1r, Cyp11Cre SKO / DKO; Cyp51, AmhrCre). <i>Seminars.</i> Short presentation of the specified topics connected with the subject of student's PhD thesis. <i>Journal Club.</i> Presentation of the original peer-review scientific paper from the field.			
Recommended Literature: Bradshaw RA & Dennis EA (2004) <i>Handbook of Cell Signaling, three volume set 1-3.</i> Academic Press. Chedrese PJ (2009) <i>Reproductive Endocrinology: A Molecular approach.</i> (www.mediafire.com/?93661b186xuga2c) Hörner M & Weber W (2012) <i>Molecular switches in animal cells.</i> FEBS Letter 586: 2084-2096. Pinilla L, Aguilar E, Dieguez C, Millar RP & Tena-Sempere M (2012) <i>Kisspeptins and reproduction: physiological roles and regulatory mechanisms.</i> <i>Physiol Rev</i> 92(3):1235-1316. Payne A & Hardy M (2007) <i>The Leydig Cell in Health & Disease.</i> www.springerlink.com/content/p47h130171162546/ Jonson MH (2007) <i>Essential Reproduction.</i> Blackwell. Review peer-review scientific paper from the field of networks of signaling pathways in reproduction.			
Weekly teaching load			Other:
Lectures: 2	Exercises:	Other forms of teaching: 3	Student research: 5
Teaching methodology <i>Theoretical part</i> – Lectures/Consultative discussions. <i>Students research work</i> – participation in the planning and execution of the experiments and the analysis, interpretation and discussion of the experimental results from the field of networks of signaling pathways in reproduction. <i>Seminars</i> - Short presentation of the specified topics connected with the subject of student's PhD thesis. <i>Journal Club.</i> Presentation of the original peer-review scientific paper from the field.			
Grading method (total number of points 100)			
<i>Scientific project problem</i> – up to 30; <i>Seminar</i> – up to 5; <i>Presentation of the original scientific paper (Journal club)</i> – up to 20; <i>Oral exam</i> – up to 45.			