Study programme: **PhD in Biology**	

Level: **Doctoral degree**

Course title: CHRONOBIOLOGICAL ASPECTS OF REPRODUCTION

Lecturers: Prof. Dr Tatjana Kostic, Prof. Dr Silvana Andric

Status: **Elective**

ECTS: **15**

Requirements: -

Learning objectives

Objective of this course is to acquire knowledge about the basic concepts of chronobiology and molecular mechanisms underlying the regulation of biological rhythms associated with reproduction. The course is focused on the study of circadian and seasonal rhythms of gene expression of endogenous biological clock and its role in the regulation and synchronization of the functions of male and female gonads of mammals.

Learning outcomes

At the end of this course students will be able to understand and describe the basic mechanisms of the molecular clock in neuroendocrine, endocrine and reproductive system, to understand the role of the central and peripheral clock in the reproductive system and the basic mechanisms of synchronization of reproduction. Using the analysis of examples from clinical practice and studies in laboratory animals, students should develop the ability of critical thinking and discussion of scientific papers in the field of chronobiology.

Syllabus

Theoretical instruction

Overview of the basic principles of chronobiology and types of biological rhythms (circadian and seasonal). The function of the molecular clock based on the auto-regulative principle of negative feedback at the level of transcription / translation of the clock genes. The central regulator of rhythm and synchronization with the peripheral clock. Biological rhythm of the hypothalamic-pituitary-gonadal axis. Effects of the biological clock on the biosynthesis of steroid hormones in female and male. Time synchronization at the level of gametogenesis and in maintenance of homeostasis of the reproductive function. Time orchestrated hierarchical neuroendocrine control of ovulation. Circadian clock and fertility: the role of ovarian clock. Circadian clock and fertility: the role testicular clock. The role of the biological clock in reproductive disorders of men and women (work in shifts and "jet-lag").

Practical instruction – Students research work

Each student will have an individual project assignment in the research related to the biological clock in the Leydig-cells. Timelines of the experiments: 6, 9, 11, 14, 17, 20, 23, 02, +24 hours. Experimental animals: peripubertal, adult and old laboratory rats. In addition, the experimental model of hypogonadal-hypogonadism as a model of disturbed homeostasis of the reproductive system will be used.

Seminars. Short presentation of the specified topics connected with the subject of student's PhD thesis..
Journal Club. Presentation of the original peer-review scientific paper from the field of of chronobiology.

Recommended Literature:

Dunlap JC, Loros JJ & DeCoursey PJ (2009) *Chronobiology: Biological Timekeeping*. Sinauer Associate Inc.
Foster R & Kreitzman L (2011) *The Rhythms Of Life: The Biological Clocks That Control the Daily Lives of Every Living Thing*. [Kindle Edition] Sinauer Associate Inc.
Chedrese PJ (2009) *Reproductive Endocrinology: A Molecular approach* (*www.mediafire.com/?9366lbl86xuga2c*)
Review peer-review scientific paper from the field of chronobiology.

Weekly teaching load				Other:
Lectures: 2	Exercises:	Other forms of teaching: 3	Student research: 5	

Teaching methodology

Theoretical part – Lectures/Consultative discussions.
Students research work – participation in the planning and execution of the experiments and the analysis, interpretation and discussion of the experimental results from the field of chronobiology.
Seminars - Short presentation of the specified topics connected with the subject of student's PhD thesis.
Journal Club. Presentation of the original peer-review scientific paper from the field of chronobiology.

<div align="center">

Grading method (total number of points 100)

</div>

Scientific project problem – up to 30; *Seminar* – up to 5; *Presentation of the original scientific paper (Journal club)* – up to 20; *Oral exam* – up to 45.