

Introduction to Circadian Biology – GS21 1361

This is a nano course aimed at students who would like to familiarize themselves with the concept of circadian timing. The course will introduce the students to the anatomical, biochemical, and molecular bases of circadian clocks, with an emphasis on the mammalian circadian system. The course will bring an understanding on how circadian rhythms are a fundamental property of living beings. Events underlying dysregulated clock function and subsequent impact on health will also be covered. The course will alternate lectures and student presentations of significant articles in the field. Active involvement of the students in class is expected.

Course directors: Christophe P. Ribelayga, Ph.D. and Ghislain Breton, Ph.D.

Lecturers: Christophe P. Ribelayga, Ph.D., Ghislain Breton, Ph.D., Kristin Mahan, Ph.D., Zheng (Jake) Chen, Ph.D., Seung-Hee (Sally) Yoo, Ph.D.

Class meets on Tuesday and Thursday 10.30-11.30 am via WebEx

Specific course objectives:

1. To understand key concepts of the physiological basis underlying circadian clocks and organization and homeostasis of the circadian system.
2. To identify key pathways involved in the entrainment of circadian clocks as well as key effectors of circadian clocks associated with the control of specific functions or behavior.
3. To learn how the daily changes in environmental factors and circadian clocks interact to modulate function and behavior on a daily or a seasonal basis.
4. To gain a working understanding of application and interpretation of experimental tests of circadian clock function that impinge on physiological processes.
5. To gain knowledge of emerging topics and techniques in the field of Circadian Biology.
6. To gain knowledge of the basis of diseases and behavior disorders linked to circadian dysfunction.

Offering: 1 semester hour. Summer annually. 16 lecture/exam days

Expected outside class hours: ~6 h/week.

Pre-requisite: None

Attendance < 30 students.

Possibility to audit the course: YES

Recommended book: TBD.

Course evaluation:

Letter grade. Grades are determined by student's participation during the classes, article discussion, as well as intellectual discussion during the classes, and performance at the final exam. The percentage breakdown is as follow:

Lecture attendance: 20%

Discussion/presentation: 20%

General participation during scientific discussion: 20%

Final take-home exam: 40%

Course Outline

Summer Semester Academic Classes Begin on May 18th, 2020

Week 1: May 19/21

Tu: Lecture: A brief history of circadian biology and basic definitions

Th: Article discussion

Week 2: May 26/28

Tu: Lecture: A review of the model systems and techniques used in circadian biology

Th: Article discussion

Week 3: June 2/4

Tu: Lecture: Anatomical features, and genetic and biochemical basis of the mammalian circadian system

Th: Article discussion

Week 4: June 9/11

Tu: Lecture: Entrainment of circadian clocks and masking mechanisms

Th: Article discussion

Week 5: June 16/18

Tu: Lecture: Circadian clocks and metabolism

Th: Article discussion

Week 6: June 23/25

Tu: Lecture: Circadian clocks and cancer

Th: Article discussion

Week 7: June 30/July 2

Tu: Lecture: Social life, work schedule, and clock dysfunction in humans

Th: Article discussion

Week 8: July 7/9

Tu: REVIEW

Th: Final Exam (take-home exam)

Last Day of Classes: August 07, 2020; Final Exams: August 10-11, 2020

End of Summer Semester: August 11, 2020