

Biological Clocks (Psych C113/Bio C143A)

Fall 2012; TTh 3-4 PM; 101 Morgan

Instructor:

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Required Readings: Readings from the primary literature, as well as review articles, are available as a course reader at *Copy Central* on University/Shattuck. The readings will be the primary focus of the course.

Course Description: This course provides a broad overview of topics in biological rhythms. The general goal of the course is not only to familiarize students with rhythms in physiology and behavior, but also to use biological rhythms as a means of learning about experimental tools in neurobiology. As a result, this course combines reading reviews of topics in the field, as well as primary empirical literature. Students will learn how to think critically about scientific questions by reviewing primary literature and leading Discussion sections. Because an important part of learning to think critically is accomplished by engaging in thoughtful discussions on relevant literature and questions in the field, students are expected to actively participate in discussions led by the instructors and the students.

Student presentations: ~3-4 students will present an empirical paper(s) relevant to the topic of discussion (see Discussion syllabus for the schedule). The presenting students will describe the background and rationale for the study, briefly describe the experimental design, and describe the results and conclusions drawn by the authors. The presentation should be used as a mechanism for fostering class discussion on the assigned paper. Students are asked to use PowerPoint or other visual aids to facilitate communicating the paper they are presenting.

Grades: Two mid-semester examinations (30% each), one final examination (35%), Presentations (5%). ** There will be NO makeup exams, so please do not miss exams **

<u>Class</u>	<u>Date(s)</u>	<u>Topic</u>	<u>Reader:</u>
Week 1	8/23	Class Introduction	pp. 11-42
Week 2	8/28 8/30	Intro to Biological Rhythms Intro to Biological Rhythms	pp. 45-66
Week 3	9/4 9/6	Mutations and Rhythm measures Significance of Timekeeping	
Week 4	9/11 9/13	Lesions/Transplant techniques The Master Brain Clock	pp. 69-102
Week 5	9/18 9/20	The Master Brain Clock Annual Rhythms	pp. 105-166
Week 6	9/25 9/27	Annual Rhythms Exam I	pp. 11-166 (and lectures)
Week 7	10/2 10/4	Histological Tools SCN Functional Compartments	pp. 169-200
Week 8	10/9 10/11	Master Clock Organization Entrainment (Retinal)	pp. 203-228
Week 9	10/16 10/18	Entrainment (Non-photoc) Entrainment (Conclusions)	pp. 229-266
Week 10	10/23 10/25	Tools in Molecular Biology Molecular timing	pp. 269-313
Week 11	10/30 11/1	Molecular timing Exam II	pp. 169-313 (and lectures)
Week 12	11/6 11/8	Hormones and Behavior <i>No Class</i>	pp. 317-368
Week 13	11/13 11/15	Neuroendocrine Rhythms Peripheral Rhythms	pp. 371-394
Week 14	11/20 11/22	Humans (sleep/shiftwork) <i>Thanksgiving</i>	pp. 397-432
Week 15	11/27 11/29	Humans (sleep/shiftwork) Rhythms and Health	pp. 435-473

**** Final Exam covers reader pp. 317-473 (and any lecture material)**

Discussion Schedule:

<u>Class</u>	<u>Date(s)</u>	<u>Topic</u>
Week 1	8/27	No Discussion
Week 2	9/3	introduction and assignment of presentation groups
Week 3	9/10	class review
Week 4	9/17	<i>Presentation I</i>
Week 5	9/24	review for exam I
Week 6	10/1	class review
Week 7	10/8	<i>Presentation II</i>
Week 8	10/15	<i>Presentation III</i>
Week 9	10/22	<i>Presentation IV</i>
Week 10	10/29	review for exam II
Week 11	11/5	class review
Week 12	11/12	No Discussion
Week 13	11/19	Thanksgiving week (no Discussion)
Week 14	11/26	<i>Presentation V</i>

Student Presentations:

1. **The SCN as the Master Clock:** Stephan and Zucker (1972); Moore and Eichler (1972)
2. **Melatonin and Seasonality:** Bartness, Bittman, and Wade (1991)
3. **SCN Functional Organization:** Kriegsfeld, LeSauter, & Silver (2004)
4. **Melanopsin and Retinal Entrainment:** Panda et al. (2003)
5. **Neural Circadian Control of GnRH Neurons:** de la Iglesia, Meyer, & Schwartz (2003)