# BIMM194 – Circadian Rhythms: physiological and molecular aspects.
# Spring 2017, 2 units

**Professor:** Jose Pruneda-Paz, Biology Building #3214.
E-mail: jprunedapaz@ucsd.edu (please use the subject line: 'BIMM194'). E-mails sent before 8 AM Mon-Fri will generally be answered on the same day. E-mails sent later than 8 AM will generally be answered the following (business) day.
Phone: 858-534-8323 (please identify yourself as a student in BIMM194).

**Class website:** On WebCT: http://ted.ucsd.edu.

**Class hours:** Wednesday, 10:00 - 11:20 AM, in YORK 3010.

**Important dates:**

April 10: manuscripts for presentations will be posted on 'TED' (http://ted.ucsd.edu).

April 14: deadline to sign up to a presenting group (up to 5 students each group). In TED (http://ted.ucsd.edu), go to 'groups' and sign up on one of the 8 presentation rosters. After this date, students will be assigned to a presentation roster by the professor (in alphabetical order according to last name).

April 19: first group will present the assigned manuscript.

*- For other important dates, see the Course Schedule below.*

**Course Prerequisites:** BIMM100 (Molecular Biology).
If you feel rusty on the material of the prerequisites, it is strongly recommended that you carefully read Chapters 4-8, of the *Lodish* textbook (7th ed), which cover material that is considered prerequisite and will only be mentioned in passing during class.

**Purpose of the course:** Biological clocks are common to most life forms in the planet. Most organisms have evolved to perform biological functions in a time-of-day specific manner. Biological clocks allow an organism to coordinate its physiology with daily environmental and endogenous. In this course you will learn how biological clocks function at the molecular level, and how clock control of physiological processes ultimately regulates optimal organismal functions. The chronobiology field has rapidly extended to many areas of biology. The goal of the course is not only to provide an overall view of this field, but also to learn how to interpret and present the primary literature that has shaped our current knowledge in it.

## COURSE STRUCTURE:

**Lectures:** In the first lecture we will review the general principles of biological clocks. In subsequent lectures (8 in all) manuscripts that illustrate key aspects of the clock function will be presented and discussed. The selected manuscripts will be available to download from website by April 10 and must be read before class. A group of up to 5 students will be assigned to each

paper. Presenters will identify the major question/s addressed by the paper, describe each figure and the corresponding conclusion and come up with a simple take-home message for the paper. **EACH presenter must be able to clearly explain ANY part of the assigned paper.**

I suggest the following template for the presentation:

1) Brief introduction and general question
2) Specific question 1, Figure 1, Conclusion from Figure 1
3) Specific question 2, Figure 2, Conclusion from Figure 2
4) Same as 2 and 3 with subsequent figures
5) Review of conclusions from each figure
6) TAKE-HOME MESSAGE/S

You are encouraged to search for an alternative manuscript for your presentation (http://www.ncbi.nlm.nih.gov/pubmed).
If you decide to do so, you must provide the manuscript to the professor at least 2 weeks prior to your assigned presentation date (either in person at the Biology Building #3214 or by e-mail at jprunedapaz@ucsd.edu) and get professor's written approval.

**Office hours: Mondays 11:00 AM – 12:00 PM, Biology building room 3214,** starting Apr 10.

**Quizzes:** There will be nine quizzes, one every week (except the first week) at the end of each paper presentation. They will consist of 4-5 multiple choice or short answer questions in relation to the paper presented. Questions will be related to conclusions or concepts emphasized during the paper presentation. Each quiz will account for 5 % of your grade.

**Participation:** Questions, comments, suggestions are encouraged at any time during the presentation.

**COURSE GRADING:**

- presentation of the assigned paper (40%)
- quizzes (45%)
- participation (15%)

Letter grades will be assigned as follows:
90-100: A
80-90: B
70-80: C
60-70: D
Below 60: F

The grading will be normalized to the highest score.

**COURSE SCHEDULE:**

| *Lecture day* | *Manuscript #* | *Manuscript title, authors & citation (PDF in TED)* | *Presenters* |
|---|---|---|---|
| 4/05/17 | N/A | **Introductory Lecture: Circadian clock overview** | J Pruneda-Paz |
| 4/12/17 | #1 | **The Adaptive Value of Circadian Clocks An Experimental Assessment in Cyanobacteria**<br>Woelfle et al.<br>Current Biology 2004, 14(16):1481–1486. | J Pruneda-Paz |
| 4/19/17 | #2 | **Positional Cloning of the Mouse Circadian *Clock* Gene**<br>King et al.<br>Cell 1997, 89:641–653. | Roster in TED |
| 4/26/17 | #3 | **Feedback repression is required for mammalian circadian clock function**<br>Sato et al.<br>Nature genetics 2006, 38(3):312-319. | Roster in TED |
| 5/3/17 | #4 | **A Hierarchical Multi-oscillator Network Orchestrates the Arabidopsis Circadian System**<br>Takahashi et al.<br>Cell 2015, 163: 148–159. | Roster in TED |
| 5/10/17 | #5 | **Control of skin cancer by the circadian rhythm**<br>Gaddameedhi et al.<br>PNAS 2011, 108(46):18790-18795. | Roster in TED |
| 5/17/17 | #6 | **Domestication selected for deceleration of the circadian clock in cultivated tomato**<br>Muller et al.<br>Nature genetics 2016, 48(1):89-93. | Roster in TED |
| 5/24/17 | #7 | **Misaligned feeding impairs memories.**<br>Loh et al.<br>Elife 2015, 4. pii: e09460. | Roster in TED |
| 5/31/17 | #8 | **Aligning work and circadian time in shift workers improves sleep and reduces circadian disruption.**<br>Vetter et al.<br>Curr Biol. 2015, 25(7):907-11. | Roster in TED |
| 6/7/17 | #9 | **TBA** | Roster in TED |