

2021-2022

221.4023 – Biological Clocks
Semester B

Time: Thursday 14:00-16:00

Instructor: Prof. Eran Tauber, **Email:** etauber@univ.haifa.ac.il

Office Hours: Meeting upon request

Course Level: (BA+MA)

Course Type & Format: Lecture

Number of Hours/Credits: 2

Prerequisites: None.

Course Overview (Short Abstract):

The body's clock drives 24 hr rhythms, which result in physiological, molecular and behavioural daily rhythms. The clock is an evolutionary conserved system that is present in wide range of organisms, from cyanobacteria and plants to insects and mammals, including human. This course covers various aspects of the clock system in integrative way, including evolutionary, genetic and neural aspects, and provides one of the best examples of system biology in action.

Learning Outcomes (What are the skills, abilities, or major concepts a student is expected to acquire in this course?) – At the end of the course students will be able to:

1. Demonstrate knowledge of the structural and functional elements of the circadian clock in animals.
2. Explain how a feedback loop can give rise to molecular rhythms, and more specifically, to 24-h rhythms
3. Demonstrate understanding of the principal Zeitgeber responsible of the clock synchronization.
4. Interpret and critically evaluate data to existing hypotheses in the field of Chronobiology.

Assessment (Assessment Method and Grade Composition):

Pre-lecture exercises 10%,
mid-term quiz 20%,
final exam 70%.

Week-by-Week Content and Assignments:

Week #	Topic	Assignment
1	Fundamental properties of the circadian clock	
2	Light entrainment	Preparatory exercise
3	The molecular circuit of the clock	Preparatory exercise
4	The molecular circuit (part 2)	Preparatory exercise
5	Central vs peripheral clocks	Preparatory exercise
6	Evolution of the clock	Preparatory exercise
7	Mid-term exam	
8	Human chronotypes: morningness vs eveningness	Preparatory exercise
9	Neural networks	Preparatory exercise
10	Photoperiodism and seasonal timing	Preparatory exercise
11	Analysis of periodical data. Computer lab	
12	Tidal and circa-annual rhythms.	
13	Clock and sleep	

Reading List:

1. Dunlap, J. (2004). *Chronobiology : Biological timekeeping* / edited by Jay C. Dunlap, Jennifer J. Loros, Patricia J. DeCoursey. Sunderland, Mass.: Sinauer Associates.
2. Kumar Vinod (2017) Biological Timekeeping: Clocks, Rhythms and Behaviour / edited by Kumar, Vinod New Delhi: Springer India (Ebook)
3. Kreitzman, L. Foster, R (2011). The Rhythms of Life: The Biological Clocks That Control the Daily Lives of Every Living Thing (Ebook)