PSYC 414
The Science of Sleep and Biological Rhythms
Fall, 2017

Sleep is a dominating presence in our biological and social lives. It is both a pleasure and a burden. It alters and challenges the way we experience the passage of time. It incorporates two of the three normal states of consciousness. It is intimately tied to remembering and forgetting. It can occur even when you think you are awake. It affects how long we live and how much we enjoy our lives. It is not optional. Yet no one fully understands the physiological mechanisms underlying sleep, or even why we sleep.

Biological rhythms coordinate virtually all the physiological and behavioral components of our existence. Whether you realize it or not, your activities every day reflect the influences of multiple ‘body clocks.’ For instance, normal sleep depends on at least three different, intertwined rhythms. Understanding biological rhythms and working with them, instead of against them, elevates your mood, keeps you alive longer, reduces traffic accidents, decreases the probability of divorce, increases the effectiveness of chemotherapy, vastly increases job productivity, moderates jet lag, enhances overall quality of life, and can even help college students pass tests.

The societal significance of biological rhythms and sleep cannot be overestimated. Throughout history, artists, writers, philosophers, clerics, and scholars have acknowledged these forces, sometimes with celebration, sometimes with scorn, always with respect. In the artificial light of contemporary society, it is easy to believe that we are emancipated from internal rhythms. That is a delusion with pervasive and profound negative consequences. Throughout the course, we will touch on such societal concerns and their relationships to the biological realities.

In format, PSYC 414 will depend heavily on readings from the scientific literature, discussion, and writing. In many cases the students will choose topics reflecting their own interests.

By the end of the course, students will:

• know and understand the basic principles of biological rhythms and sleep
• understand the current ideas regarding the function(s) of rhythms, sleep, and dreaming including CNS plasticity, homeostasis, and biological time management.
• appreciate and discuss intelligently the many historical, personal, social, and societal implications of biological rhythms and sleep, including the effects of disruption in these fundamental biological processes.
Twice during the semester, each of you will stop by my office for 10-15 minutes of informal conversation. There is no particular agenda other than to get to know each other. The first meeting should be before September 22nd and the second before October 27th. We can do the scheduling by email. Although completely informal and not graded, these meetings are required.

Please, please don’t wait until the last minute to do your office visits. You will have limited options for scheduling your appointment, and you will make it difficult for others as well.
Although the emphasis in PSYC 414 will be on writing and discussing, we will have three exams during the semester and a final exam. Exams are not anyone's favorite part of a course, but they serve important purposes. They are excellent motivators for studying and learning. More importantly, however, they are an opportunity to pause in your 'data acquisition' and spend some time tying ideas together and making sense of it all.

Grades in the course will be based on three in-class examinations (100 pts. each), a cumulative final exam (300 pts.), two ‘chosen topic’ projects (80 pts. each), and 14 journal entries (140 pts.).

The semester examinations will deal with: #1 - basic concepts of biological rhythms and biological clocks; #2 - basic concepts of sleep; and #3 sleep and neural plasticity. The final exam will cover the last four classes of the course, and it will bring together major concepts and ideas from the whole course. Study materials of various types will be available a week before the exam. We normally have a review session a day or two before each exam.

Teams of 2-3 students will lead class discussions on a topic chosen by the team. Each student will do this twice during the semester. The team will have four tasks: 1) become knowledgeable on their topic; 2) choose 1-2 papers for the whole class to read in preparation for the discussion; 3) create an annotated outline to guide the discussion; and 4) lead the 50-minute discussion. I will post detailed instructions and a list of possible topics on CANVAS. Each student in the group will get the same grade. However, unexcused absence from leading the discussion will incur a 20-point penalty, i.e. the assigned score minus 20 points.

Every Friday, we will discuss one or more literature papers on a topic related to the lecture material. The focus will be on practical, cultural, and societal aspects of rhythms and sleep science. The papers and other materials for our Friday discussions will be available on CANVAS about a week beforehand.

In preparation for each Friday discussion, all members of the class will write a section in their journal posing questions about the readings, proposing further experiments, providing commentary and insights, and/or contributing supplementary information. Journal entries will be graded. Detailed information about the journal entries, and about reading scientific research papers is up on CANVAS.

There will be no extra-credit assignments. However, journal entries beyond those required and work on the wiki can contribute to your grades - see the detailed instructions on CANVAS.

The final grade will simply be the earned points as a percentage of the total possible points. Letter grades will be assigned using an equal divisions scale, e.g. 80.00 to 83.29 = B-, 83.30 to 86.69 = B, 86.70 to 89.99 = B+

An "incomplete" will be assigned as a grade only in cases of compelling and documented need. Incompletes are normally reserved for students experiencing a catastrophic event near the end of the semester. To qualify for an incomplete, the student must have finished a substantial portion of the course and be performing at a "C" level or better. The student will be asked to sign an "incomplete contract" stipulating the requirements and date for the completion of the course and assignment of a final grade.
**COURSE POLICIES**

PSYC 414 will follow the general University-wide policies for undergraduate courses that you can find here: [Policies for Undergraduate Courses](#).

What follows are policies specific to this course and brief descriptions of the general policies.

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**Electronics in the classroom**

No computers, phones, or tablet devices are permitted during our classes.

I understand and have considered all the arguments, valid and not, for permitting laptop and tablet computers in the classroom. However, the reality is that they present an irresistible distraction, detract from the cooperative learning environment, and unfairly affect other students. Based on ever-increasing volumes of research evidence, the distractions created by electronics in the classroom interfere with learning and active participation. In a small, discussion-based class like ours, that is especially counterproductive. For those reasons, the use of computers of any kind and of phones is banned from lectures. (The exception is when a computer is required for a DSS accommodation.)

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**Absences**

Regular attendance in class is essential for success in this course. In a discussion-oriented course like ours, your regular attendance is necessary for you personally, but even more importantly, the other members of the class depend on you to contribute and enrich the discussions.

If you should need to miss a single class, be sure to get notes from a classmate and go to CANVAS for the slides. Let me know if I can help. It is not necessary to provide an excuse for an individual missed class if there is no graded activity on that day. If a debilitating illness or an emergency situation will make it impossible to take an exam or lead a discussion, it is mandatory that you notify me as soon as possible, preferably before or on the day of the exam/presentation. You must present complete and valid documentation before any makeup exam or assignment can be taken. Failure to fulfill these requirements will result in a grade of zero.

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**On-line**

We have a CANVAS site for the course and will be using it extensively. It will be:

- a source for basic information (syllabus, readings, discussion materials, etc.)
- the host of your journals
- a communications channel for course information of immediate importance
- a convenient way for students to communicate and work together
- a source for study materials before each test
- a vehicle for reporting and keeping track of grades

To access CANVAS, go to [ELMS](#) which is both a portal and a source of help and information about the system. If you have trouble logging on or other issues, try the [OIT Help Desk](#).
Students with disabilities

- If you have a documented disability, you should contact Disability Support Services 0126 Shoemaker Hall. Each semester, students with documented disabilities should apply to DSS for accommodation request forms that you can provide to your professors as proof of your eligibility for accommodations. **This form should be provided at the beginning of the semester. Special arrangements for each individual test should be made at least a week before the test date.** The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS web site at [The Counseling Center](#).

Religious observances

- The University System of Maryland policy provides that students should not be penalized because of observances of their religious beliefs, and students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. **It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible, but no later than the end of the schedule adjustment period.** Prior notification is especially important in connection with final exams, since failure to reschedule a final exam promptly can have very serious academic consequences.

Course evaluations

- Your participation in the evaluation of courses through CourseEvalUM is a responsibility you hold as a student member of our academic community. Your feedback is confidential and important to the improvement of teaching and learning. CourseEvalUM will be open for you to complete your evaluations starting about two weeks before the end of the semester. You can go directly to the website ([CourseEvalUM](#)) to complete your evaluations. By completing all of your course evaluations each semester, you will have the privilege of accessing the summary reports for thousands of courses online at Testudo.

Academic integrity

- Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. Accordingly, the Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University share this responsibility, the Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with the students. It is the responsibility of each student to understand what actions constitute a violation of the Code.

- The University of Maryland honor system is fully described in the Code of Academic Integrity. Please see: [Student Honor Council](#). In the event that an Honors College student is found responsible for a violation of the Code of Academic Integrity by the Student Honor Council, he or she will be dismissed from the Honors College for the semester in which the violation took place and for all subsequent semesters in which the student is enrolled as an undergraduate at Maryland. Additional penalties may be imposed by the Student Honor Council.

Copyright

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- Class meetings and course materials, including instructions, presentations, assessments, content outlines, and similar materials are the intellectual property of the course instructor and protected by legal copyright. You may take notes and make copies of course materials for your own personal use. You may not, nor may you allow others to, distribute lecture notes and course materials publicly, whether or not a fee is charged, without the express written consent of the instructor. Copyright violations may result in referrals to the Office of Student Conduct and/or civil penalties under State and Federal law.
Class Schedule

During the first part of the course, we will focus on circadian rhythms. In the second, the focus will be on the basics of sleep. We will then move to the question of sleep's role in CNS plasticity. Finally, we will spend two weeks learning about dreaming.

The specifics of the schedule are not set in stone, and you can expect some modifications to specific lecture topics as we go along.

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<thead>
<tr>
<th>Week of</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>August 28th</td>
<td><strong>Rhythm basics</strong></td>
<td><strong>Rhythm basics</strong></td>
<td><strong>Paper discussion #1</strong></td>
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<td>Definitions, free-run, tau, sleep propensity</td>
<td>Phase, chronotype, lifespan changes</td>
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<td>September 4th</td>
<td>Labor Day</td>
<td><strong>Rhythm basics</strong></td>
<td><strong>Paper discussion #2</strong></td>
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<td>Entrainment, zeitgebers, phase response curve</td>
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<td>September 11th</td>
<td><strong>Rhythm basics</strong></td>
<td><strong>Chosen topic</strong></td>
<td><strong>Paper discussion #3</strong></td>
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<tr>
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<td>Circadian visual system, SCN, pineal gland</td>
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<tr>
<td>September 18th</td>
<td><strong>Chosen topic</strong></td>
<td><strong>Chosen topic</strong></td>
<td><strong>Paper discussion #4</strong></td>
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<td>September 25th</td>
<td><strong>First exam</strong></td>
<td><strong>Sleep basics</strong></td>
<td><strong>Paper discussion #5</strong></td>
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<td>Definition(s), sleep architecture, SWS, REM,</td>
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<td>October 2nd</td>
<td><strong>Sleep basics</strong></td>
<td><strong>Sleep basics</strong></td>
<td><strong>Paper discussion #6</strong></td>
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<td>Sleepiness, misperceptions, two-factor model</td>
<td>CNS systems for falling asleep and waking up</td>
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<td>October 9th</td>
<td><strong>Sleep deprivation</strong></td>
<td><strong>Chosen topic</strong></td>
<td><strong>Paper discussion #7</strong></td>
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<td>Chronic partial, deficits, misperceptions,</td>
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<td>recovery</td>
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<td>October 16th</td>
<td><strong>Chosen topic</strong></td>
<td><strong>Chosen topic</strong></td>
<td><strong>Paper discussion #8</strong></td>
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<td>October 23rd</td>
<td><strong>Second exam</strong></td>
<td>Sleep and memory</td>
<td>Paper discussion #9</td>
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<td>Enhancements in explicit and implicit memory</td>
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<td>October 30th</td>
<td>Sleep and memory</td>
<td>Sleep and memory</td>
<td>Paper discussion #10</td>
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<td>Critical timing of enhancement, limits</td>
<td>Enhancement, stabilization of emotional memory</td>
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<td>November 6th</td>
<td>Sleep and memory</td>
<td>Chosen topic</td>
<td>Paper discussion #11</td>
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<td>Theories about mechanisms, replay</td>
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<td>November 13th</td>
<td>Chosen topic</td>
<td>Chosen topic</td>
<td>Paper discussion #12</td>
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<td>November 20th</td>
<td>Third exam</td>
<td>Thanksgiving</td>
<td>Thanksgiving</td>
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<tr>
<td>November 27th</td>
<td>Dream basics</td>
<td>Dream basics</td>
<td>Paper discussion #13</td>
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<td>Definition(s), types of dreams, characteristics</td>
<td>Dream content, dreams and memory, function(s)</td>
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<td>December 4th</td>
<td>Chosen topic</td>
<td>Chosen topic</td>
<td>Paper discussion #14</td>
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<tr>
<td>December 15th</td>
<td>Final exam</td>
<td>8:00 - 10:00 am</td>
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Readings

Note that these are not traditional ‘reading assignments’ and there are no ‘due dates.’ The readings given below are guidelines. I have not tried to be all inclusive - there are often other relevant sections in one or more of the texts that you can profitably read. The readings ‘groups’ are given in the approximate order of the topic in class.

**August 29th through September 20th**

- Roenneberg – Introduction, Chapters 4, 5, and 22
- Foster and Kreitzman – Chapters 1, 2, and 8

- Roenneberg – Chapters 1, 2, 7, 8, 12, 21, and 23
- Foster and Kreitzman – Chapters 1, 2, and 8
- Green and Westcombe – Chapter 3

- Roenneberg – Chapters 14, 17, and 18
- Lockley and Foster – Chapter 5

- Roenneberg – Chapters 13, 15, 16, 19, and 20
- Lockley and Foster – Chapter 8
- Foster and Kreitzman – Chapters 3 and 7

- Roenneberg – Chapters 6, 9, and 10
- Foster and Kreitzman – Chapters 4 and 5

**September 25th through October 20th**

- Roenneberg – Chapter 11
- Lockley and Foster – Chapters 2
- Foster and Kreitzman – Chapter 6
- Green and Westcombe – Chapter 8

- Roenneberg – Chapter 3
- Lockley and Foster – Chapter 3
- Bulkeley – Part 1
- Green and Westcombe – Chapters 1 and 2

- Lockley and Foster – Chapter 6
- Green and Westcombe – Chapter 9

- Lockley and Foster – Chapter 7
- Green and Westcombe – Chapter 14