HEB 1317: Evolution, Anatomy, and Physiology of Sleep
Spring 2024
1/17/2024 DRAFT SYLLABUS – MAY BE SUBJECT TO CHANGE

Meeting time: Monday 12:00 – 1:15 pm and Wednesday 12:00 – 1:15 pm in the DeVore Conference Room (MCZ 529). Please note that due to the participatory nature of this seminar and the small class size, attendance is required.

Instructor: Dr. Joanne (Jo) Clark-Matott (DPhil), Preceptor in Human Evolutionary Biology (jclarkmatott@fas.harvard.edu). I am happy to be addressed as Jo in the classroom.

Course Description: HEB 1317 is a research seminar that combines independent research with instruction in research methods and data analysis, and the central tenets of sleep and circadian science viewed through an evolutionary lens.

Time Commitment: In addition to scheduled course sessions, you are expected to spend an additional 2-4 hours per week on reading and assignments for this course.

Learning Objectives: The overarching goal of this seminar is to introduce you to some of the fundamental aspects of sleep research and to guide your exploration of this field.

Over the course of this seminar, you will gain proficiency or mastery of some of the analytic skills used by sleep scientists including sleep scoring and the identification of brain regions involved in sleep as well as basic analysis of data. In addition, you will gain familiarity with sleep diaries, one of the tools employed by clinical or field-based sleep scientists.

You will also gain proficiency or mastery of the 'soft skills' required for effective communication in science. These include the formal communication of scientific information both verbally and in writing, and the informal communication skills required to successfully collaborate with others and create a vibrant research environment.

Course Policies and Expectations.

Academic Integrity: Discussion and the exchange of ideas are essential to academic work. For most assignments in this course (except for graded quizzes), you are encouraged to consult with your classmates and course instructor on the choice of presentation and research topics and to share details of resources of overlapping interest. You may also use generative artificial intelligence (GAI) tools such as ChatGPT to explore ideas and structures for assignments, or as a peer editor before submission. Any collaboration with others or use of GAI must be noted on the assignment submitted. If using GAI, it is each student's responsibility to assess the validity and applicability of any GAI output that is submitted. (It is worth noting that ChatGPT fabricates citations and I do check the validity of citations).

You may choose to form a research cluster with other students to pursue your independent research as a collaborative endeavor which will involve group work and group discussion. It is important that each member of the group does their own work for all aspects of the project (data sourcing, cleaning, analysis etc.), and each member of the group must submit their own write-up of the data.

In short, you should ensure that any written work you submit for evaluation is the result of your own research and writing and that it reflects your own approach to the topic.

Attendance and Participation: Attendance and participation are absolutely required for this research seminar. Collaboration is key and it is not possible to foster a collaborative environment without participation from everyone in the group. However, it is likely that there will be a time when illness or circumstance means that you cannot attend a particular session. In this case, please contact me (jclarkmatott@fas.harvard.edu) as soon as you can.

Assignment Lateness and Exceptions: All assignments must be submitted and graded before the end of the course period for successful completion of the course. You should make a plan to manage your workload in a way that facilitates adherence to published deadlines.

HEB 1317 is structured in a manner that builds towards submission of a final paper describing your original research; therefore, staying up to date with assignments is essential for mitigating stress and staying on track. If an unforeseen circumstance will affect the timely submission of your assignment, then please contact me to request an extension of time *in advance of the deadline*. Please note that increased workload in other courses, or exams for other courses do not constitute an unforeseen circumstance. Late assignments without an agreed extension of time will accrue a deduction of 10% per day.

Office Hours: It has been my experience that office hours are poorly attended during the first half of the course and over-subscribed during the latter half. For this reason, I have not scheduled any office hours during the first half of the semester and have dedicated class time to office hours in April. Additional hours may be made available on request, and we can also meet by appointment. The easiest way to schedule a meeting is to use my Calendly link (https://calendly.com/heb-preceptor/30min) which will automatically place our meeting on my calendar.

Class Cancellation: An announcement will be sent via Canvas email in the unlikely event of necessary cancellation of class.

Materials and Access.

Course Website: You will find the readings for the course as well as assignments and due dates on Canvas https://canvas.harvard.edu/courses/129876

Textbook: 'Sleep: A Very Short Introduction' by Steven W. Lockley and Russel G. Foster (Oxford University Press) is available from the Harvard COOP and other booksellers. The book retails at under $10 and is a required reference source. You can also access a pdf of the book using the Library Reserves link on Canvas.

Access and Accommodations: If you are interested but unsure about HEB 1317, please email me (jclarkmatott@fas.harvard.edu) with any questions or schedule a chat over Zoom. There is also an 'Assignment 0' on Canvas that can be completed in advance of registration to assess whether you would benefit from some short, additional reading before the course begins.

This course has no exams (just a single quiz) and flexibility with deadlines is available by prior arrangement. If you are already working with the Disability Access Office (DAO), please forward the accommodation letter to me (jclarkmatott@fas.harvard.edu) and we'll arrange a meeting to talk about strategies to help you succeed in HEB 1317.

DAO Access Statement: Harvard University values inclusive excellence and providing equal educational opportunities for all students. Our goal is to remove barriers for disabled students related to inaccessible elements of instruction or design in this course. If reasonable accommodations are necessary to provide access, please contact the Disability Access Office (DAO). Accommodations do not alter fundamental requirements of the course and are not retroactive. Students should request accommodation as early as possible since they may take time to implement. Students should notify DAO at any time during the semester if adjustments to their communicated accommodation plan are needed.

Assignments and Grading Procedures.

Assignment Type	**Assignment Title**	**% of grade**
Data collection	Sleep diary	15%
Essay	Why sleep? A brief discussion of proximate and ultimate causes of sleep.	10%
Intro to data analysis	How well do HEB 1317 students sleep?	10%
Presentation	Sleep disorders: (TBD)	5%
Canvas quiz	Identification of brain nuclei involved in arousal	5%
Independent research	TBD!	30-45%
In-class presentation of final project	Methodology, results, and main conclusion of research project	10%
Optional essay	Sleep diary: report and reflections	15%

In most cases, rubrics are available on Canvas to view prior to completing the assignment.

Letter grades are awarded as follows: A=94-100%, A-=90-93%, B+=87-89%, B=84-86%, B-=80-83%, C+=77-79%, C=74-76%, C-=70-73%, D+=67-69%, D=64-66%, D-=60-63%, F=<60%. Grades will not be curved.

Sleep Diary: Data Collection and Intro to Data Analysis. Sleep diaries are frequently used research and clinical tools that, while flawed, can provide useful repeated-measures data on sleep habits, sleep duration, and sleep efficiency. HEB 1317 students record data in a modified version of the NIH National Heart, Lung, and Blood Institute which may be shared anonymously for data analysis. (See example at the end of this document. *Please note we do not include questions on alcohol or medication use*.) Sleep data have been collected for the past three years (during remote learning and for the last two in-person spring semesters) and current HEB 1317 students will interrogate these data using standard statistical tests to answer questions related to differences in sleep patterns between these two cohorts.

Independent Research. Independent research projects for HEB 1317 use publicly available datasets, data that you collect yourself, or research data obtained by Dr. Clark-Matott (in the case of sleep scoring or neuroanatomical examination). You may decide to work on one of the projects listed at the end of this section or to begin your own research project. Please be aware that you **must** begin thinking about the type of research project that you would like to do far in advance of the project proposal deadline. Additionally, if you hope to further develop your work from this class then you should be aware that the deadlines for summer research funding are usually in early March. You can find out more from The Office of Undergraduate Research and Fellowships (URAF; https://uraf.harvard.edu/).

Research projects may be conducted individually or in small groups. If working in small groups, it is essential that all members participate in *each and every step* of the project (e.g., data sourcing, cleaning, and data analysis). It is also imperative that all written work is produced by you alone, and that it reflects your approach to the topic and interpretation of the data. For example, a group may work together to find the most useful data set in a particular database and then work sequentially to clean the data before performing data analysis as a group. Alternatively, members of a group could examine different data sets using the same methodology to interrogate a particular research question. Each member of the group would write their own final paper on the group's findings or the collected findings from the two data sets.

Whether working individually or in a group, you are encouraged to talk about your work early and often with the instructor and your peers. Discuss how to clean the data to make it more manageable (What data is necessary to interrogate your hypothesis? What can be discarded?), discuss the implications of your research (Would people be helped/harmed/hindered by your research? Why is the work you propose interesting to you?). The more you talk about your research, the better your final independent research report will be.

Ongoing Projects (descriptions to follow)**.** *APOE Derived Alleles as Predictors for Sleep Disruption in Midlife; Association of Derived Alleles with Unique Human Sleep Architecture;*
Armodafinil Induced Neuronal Activity in Wake-Extended mice; Effects of Wake-Extension on Neuronal Tau and Extracellular Aβ

Course Outline

Week	Date	Session Title	Assignment
1	Mon, Jan 22nd	Overview of HEB 1317 and Introduction to Sleep Diaries	*Start sleep diary*
	Wed, Jan 24th	Process of sleep and circadian rhythms	
2	Mon, Jan 29th	Club EvMed: Archaic Introgression Shaped Human Circadian Traits	
	Wed, Jan 31st	Exploring Genetic Correlates of Sleep	
3	Mon, Feb 5th	Clues to the Function of Mammalian Sleep	*Essay assigned*
	Wed, Feb 7th	Correlation and Regression	
4	Mon, Feb 12th	Research using sleep diary data	*Essay due*
	Wed, Feb 14th	Introduction to sleep disorders	
5	Wed, Feb 21st	Student sleep disorders presentation	*10-minute presentation*
6	Mon, Feb 26th	Student sleep disorders presentation	*10-minute presentation*
	Wed, Feb 28th	Discussion of project ideas	
7	Mon, Mar 4th	Hypothesis testing	*Project proposal deadline*
	Wed, Mar 6th	Research methods workshop	
8	Mon, Mar 11th	*No Class*	
	Wed, Mar 13th	*No Class*	
9	Mon, Mar 18th	Neuroanatomy of sleep circuits	*Neuroanatomy of sleep circuits quiz*
	Wed, Mar 20th	Office hours	
10	Mon, Mar 25th	Polysomnography	*Deadline for literature review*
	Wed, Mar 27th	Sleep scoring	
11	Mon, Apr 1st	Project updates (table talk)	
	Wed, Apr 3rd	Office Hours	
12	Mon, Apr 8th	Office Hours	
	Wed, Apr 10th	Office Hours	
13	Mon, Apr 15th	Student final presentations	*15-minute presentation*
	Wed, Apr 17th	Student final presentations	*15-minute presentation*
14	Mon, Apr 22nd	Student final presentations	*15-minute presentation*
15	Wed, Apr 24th	Last meeting	*Deadline for final paper submission and (optional) sleep diary reflection*

Important: You are expected to prepare for each session by completing the assigned reading (listed on Pages in Canvas) in advance of the session.

Sleep Diary

Use this sleep diary to record the quality and quantity of your sleep; your use of medicines, alcohol, and caffeinated drinks; and how sleepy you feel during the day. Bring the diary with you to review the information with your doctor.

Fill out before going to bed	Today's date:	June 13*							
	Number of caffeinated drinks (coffee, tea, cola) and time when I had them today:	1 drink, 8 p.m.							
	Number of alcoholic drinks (beer, wine, liquor) and time when I had them today:	2 drinks, 9 p.m.							
	Naptimes and lengths today:	3:30 p.m., 45 minutes							
	Exercise times and lengths today:	None							
	How sleepy did I feel during the day today? 1—So sleepy I had to struggle to stay awake during much of the day 2—Somewhat tired 3—Fairly alert 4—Alert	1							
Fill out in the morning	Today's date:	June 14*							
	• Time I went to bed last night: • Time I got out of bed this morning: • Hours spent in bed last night:	11 p.m. 7 a.m. 8							
	Number of awakenings and total time awake last night:	5 times, 2 hours							
	How long I took to fall asleep last night:	30 minutes							
	Medicines taken last night:	None							
	How alert did I feel when I got up this morning? 1—Alert 2—Alert but a little tired 3—Sleepy	2							

* This column shows example diary entries—use as a model for your own diary notes.