NEUR 424 – Sleep and Circadian Rhythms
Fall 2022

Instructor: Dr. L. Ren Guerriero (they/them)
Their email: lguerrie@gmu.edu
Their phone #: 703-993-5901
Meeting times: Wednesday 1:30-4:10 pm
Meeting location: Thompson Hall L004
Office Hours: Thursday 10:00-11:00 am
Office Location: Krasnow 253 and Zoom
Password: sleepy

What is this class?

This course introduces the fields of circadian rhythms with emphasis on sleep including the underlying molecular and genetic machinery, neuroanatomy, and neurophysiology. The impact of sleep and lack thereof will be explored on diseases and modern society. Considerable time will be spent reading and analyzing the primary literature in human and animal models.

What will I get out of this class?

Learning Outcomes:

(1) display knowledge of the systems underlying sleep and circadian biology
(2) identify and explain the causes and consequences of insufficient sleep and
(3) recognize the importance of sleep hygiene for health and optimal performance.

This course also meets the Synthesis requirements for Mason Core. Upon completing this course, you will demonstrate your ability to:

1. Communicate effectively in both oral (**News in Sleep presentations**) and written forms (**Sleep Assessment Paper**), applying appropriate rhetorical standards (e.g., audience adaptation, language, argument, organization, evidence, etc.)
2. Using perspectives from two or more disciplines, connect issues in a given field to wider intellectual, community or societal concerns (with weekly readings).
3. Apply critical thinking skills to:
    a. Evaluate the quality, credibility and limitations of an argument or a solution using appropriate evidence or resources, OR,
    b. Judge the quality or value of an idea, work, or principle based on appropriate analytics and standards (**Sleep Assessment Paper – Introduction**)

How do I do well in this class?

This class relies heavily on discussion and readings. To do well you need to do your readings before coming to class and be ready to discuss. I recommend taking notes when reading and coming prepared for discussion. Also, communication is key to doing well in this course. You will be graded on your written and oral communication, but communication is necessary when you are confused in class. To make sure we all know how to act in class, our first day we will write and vote on a code of conduct, which will them be added to the syllabus. This will include both instructor and student responsibilities. It is then our job to uphold ourselves and other to the code of conduct.

What are our responsibilities? (Code of Conduct)
These will be written and voted on in our first meeting of the class.

Student responsibilities:

- Come prepared with to class with readings done prior class. Come to class on time (1:30 pm EST)
- Maintain a respectful discussion. This includes but is not limited to:
    - Not interrupting others, respecting opinions, accepting that mistakes happen, disagreeing with ideas not with people, engaging with instructor and other students, and being open minded.
- No plagiarism. Students will be upheld to the GMU Student Honor Code.
    - Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using the appropriate format for this class. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see Dr. Guerriero.
- Have proper communication, especially if you are not going to be in class or missed an assignment. All emails must be sent using your personal GMU email. All emails should be honest and truthful in content.
- During group work, students will contribute equitably, communicate complications including not finishing the work, be receptive to others' ideas, and bring up your ideas to discuss.
- It's okay to say I don't know
- Follow GMU official policies related to COVID, disasters, etc.
    - (8/24/2022 currently there are no COVID policies in place)

Instructor responsibilities:

- The instructor will have 48 hours to reply to emails (business days only).
- They will provide practice exam questions and exam review time in class the week before the exam.
- They will post course materials on Blackboard two weeks ahead of class time.
- They will have assignments graded in 7 business days
    - Written assignments will be given feedback on content, clarity, formatting, and writing style.
- Office hours are always available by appointment as needed in person and on Zoom. Email lguerrie@gmu.edu to set up an office hour.
- All assignments will have detailed instructions and rubrics given to students. They will also provide information on how to write a scientific article (e.g. introductions, abstract, methods, results, discussion) and how to read a primary article.
- Proper communication will be maintained, including but not limited to: if you are not going to be in class, being honest and genuine, respecting opinions, acknowledging that mistakes happen, disagreeing with ideas not with people, engaging with students, and always being open minded.
- It's okay to say I don't know

- All course materials posted to Blackboard are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.
    - Video recordings -- whether made by instructors or students -- of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class

How will I be graded in this class?

Grading Scale:

A+	97-100%	B+	87-89%	C+	77-79%	D	60-69%	F	0-59%
A	90-96%	B	80-86%	C	70-76%				

Exams (2, 50 points) – You will have two exams: one midterm and one final in this course. They will contain a mixture of multiple choice, short answer, and longer essay questions.

Sleep assessment paper: You will be writing a research-style paper over an intervention on your own sleep patterns. This will be broken into a few sections to keep you on track throughout the semester. This intervention can be a number of things lasting a very short time or a much longer intervention. You will track how this intervention impacts your sleep quality and/or quantity or your waking quantity/quality or both. The type of intervention must be justified in your paper with a review of the literature (the introduction below will be helpful on this). The intervention could be as simple as a new behavioral technique to improve your sleep or waking state across a school week or weekend. Could be diet or drinking changes, etc. Charts, graphs, tables, or other form of visual aids are expected along with the APA style report. Quantitative data analyses are required (let me know if you need help with statistics).

- **Sleep journals** (9, 10 points each) – Each week you will submit a standardized journal including your sleep times and wake times. You can do this manually using the provided sleep journal (on Blackboard) or using a Fitbit / other app that tracks sleep/wake. Additions to the standardized journal can be made to meet your research question. Tracking your sleep daily will take some discipline, but once it becomes a habit it will be an easy part of your daily routine. Each journal entry will be included in your final research paper as supplemental data.
- **Topic approval** (15 points) – Write a short abstract/ paragraph (no more than 300 words) describing your rational, methods, and expected results for you sleep experiment. Upon approval of your topic by Dr. G you can proceed with your project. If you want to start the project earlier, topics can be turned in early.
- **Introduction** (50 points)– The introduction is a description of your logic based on the previous research to support the value of your research questions. It will include 10 primary research articles that you found to support your choice in sleep intervention. For each primary article, the introduction should mention its main findings, limitations, and how it relates to your intervention. The intervention's basic manipulation, expected results, and hypothesis should be discussed.
- **Draft of paper** (+5 points to your final research paper or final exam, whichever is lower)– If you so choose, you can turn in a draft of your paper for revision by Dr. G.
- **Final research paper** (80 points)– The final research paper will describe the project you completed throughout the semester with you as the subject. It will be 10 pages in APA style. This will include an introduction, methods, results (include statistical

analysis), discussion, and references. A full rubric and description is posted on Blackboard.

News in Sleep presentations (30 points) – Every week, we will have one student present a 15-minute talk about a recent breakthrough in the sleep field. This will be based off a primary literature article that was written in 2017 or more recent. Using visual aids such as slides is recommended, but not required. Weeks of assignments will be determined during the first day of class. The week before you must send your journal article to the entire class (email to Dr. G and they can distribute) for discussion.

Participation and Assignments (6 points/day) – Attending class is an essential component of the learning process for the majority of students. The instructor will be monitoring your attendance and participation in the class. In order to receive credit for a discussion session, you must make a meaningful contribution to the discussion. You must talk and your question or comment must represent that you have read the article being discussed. If you do not talk or are absent, you will not receive credit for the day. Excused absents can be given if you contact Dr. G before missing the class as soon as you are able.

I missed class or an assignment, what do I do?

Life is unpredictable and illness (both physical and mental) should be taken seriously. If you know you will not be in class, email Dr. Guerriero. Holidays, illnesses, and university sanctioned events likely count as an excused absence, but only if you notify Dr. Guerriero either before the event or as soon as you decide you're too ill to come to class. Next, if you miss class, look at Blackboard for the information covered in class. If the article doesn't make sense to you, email Dr. Guerriero. If the slides are confusing, email Dr. Guerriero.

Missed Assignments

- "Life Happens Pass" – For one written assignment this semester you can get an automatic 48-hour extension on the due date, no questions asked. **You must inform Dr. Guerriero in writing (email) to get this pass.**
- All other missed assignments will get a 20% deduction for being late, regardless of the delay. It is to your benefit to turn in assignments late. Most of the points are better than no points!

I'm struggling in this class. How do I get help?

I don't understand the class material, assignments, my grades – email Dr. Guerriero. When emailing us, you have to use your gmu.edu email account or we cannot verify that the email came directly from you.

I'm stressed, anxious, angry, or mentally unwell – Counseling and Psychological Services have drop-in hours or virtual services, including a text line, online chat, and video chats. If its outside business hours, they have an after-hours crisis counselor (call 703-993-2380 and selection option 1).

I need help with time management, note taking, or other study skills – Talk to Dr. Guerriero or reach out to Learning Services for a personalized appointment and online tools.

I'm struggling with social issues that impact my identity, my culture, or me personally – College and higher education is inherently exclusionary, racist, sexist, and classist, and I'm committed to helping change that. Mason is also committed to this, with lots of resources:

Center for Culture, Equity, and Empowerment (includes bias incident reporting form)

First-Gen+ Center (resources for first-generation, undocumented, refugee, and limited income students)

LGBTQ+ Resources Center (including crisis, community, and gender transition resources)
Student Support and Advocacy Center (resources for financial help, sexual and interpersonal violence support, and drug/eating disorder recovery)

I need class accommodations for a disability, illness, or other reason – First talk to Disability Services office. They will meet with you virtually and help you with your individual needs. We can only activate your accommodations after you talk with Disability Services. Then talk to Dr. Guerriero about this class; they are happy to help you with what you need.

Tentative Schedule – Fall 2022

Subject to change (check Blackboard for the most recent version)

Date	What we are discussing	How to prepare for class	When is homework due?
Week 1	- Syllabus and code of conduct - What do you know about sleep already? What bothers your sleep?	- Read: Syllabus - Read: Blackboard page	- Pre-Class Survey due Aug 30 at 11:59 pm
Week 2	- Do flies even sleep? The diversity of sleep - How to measure sleep in humans: PSQI, ESS, Sleep journals	- Read: Hobson, 2005 Sleep is by the brain for the brain - Read: Seigel, 2008 Do all animals sleep? - Review: Sleep journal 1 on Blackboard	- Sleep journals start: Sleep journal 1 due Sep 6 at 11:59 pm
Week 3	- How do you describe a rhythm? Phase, phase shifts, zeitgeber - Genetic basis of circadian rhythms	- Read: Vitaterna *et al.,* 1994 Mutagenesis and mapping of a mouse gene, *Clock,* Essential for Circadian Behavior	- Sleep journal 2 due Sep 13 at 11:59 pm - Topic approval for Sleep assessment paper: due Sep 13 at 11:59 pm
Week 4	- Neurological and hormonal control of circadian rhythms	- Read: Buxton *et al.,* 2003, Exercise elicits phase shifts and acute alterations of melatonin that vary with circadian phase - Skim: Ko and Takahashi, 2006, Molecular component of the mammalian circadian	- Sleep journal 3 due Sep 20 at 11:59 pm
Week 5	- Neurological and hormonal control of sleep and circadian rhythms	- Read: Maret *et al.,* 2007, Homer1a is a core brain molecular correlate of sleep loss	- Introduction due Sep 27 at 11:59 pm - Sleep journal 4 due Sep 27 at 11:59 pm
Week 6	- Why do I sleep like this? Evolution of sleep in humans and sleep changes across the lifespan	- Read: Aurora *et al.,* 2016, Habitual sleep duration and all-cause mortality in a general community sample	- Sleep journal 5 due Oct 4 at 11:59 pm - Find an app marketed to improve your sleep and be ready to discuss on Oct 5
Week 7	- Exam 1	- Study	- Sleep journal 6 due Oct 11 at 11:59 pm
Week 8	- Sleep technology: EEG, PSG, actigraphy	- Read: Yetish *et al*., Natural sleep and its seasonal variations in pre-industrial societies	- Sleep journal 7 due Oct 18 at 11:59 pm
Week 9	- Beginners guide to EEG - Quantification of sleep: What stats do	- Read: EEG Primer	- Sleep journal 8 due Oct 25 at 11:59 pm

Week 10	- Why do we sleep? - Glymphatic system	- Read: Xie *et al.,* 2013, Sleep drives metabolite clearance from the brain	- Sleep journal 9 due Nov 1 at 11:59 pm
Week 11	- Sleep disorders	- Read: Joiner, The Neurobiological Basis of Sleep and Sleep Disorders	
Week 12	- Dreaming - Health outcomes of disrupted rhythms	- Read: Letzen *et al.,* 2021 Racial disparities in sleep-related cardiac function in young, healthy adults: implications for	- Extra Credit: Draft of Sleep Assessment paper for feedback due Nov 9 at 11:59 pm
Week 13	- Racial disparities in sleep and impact on health - Changing sleep	- Read: Kompotis *et al.,* 2019 Rocking in Mice	
Week	- Thanksgiving Break	- Rest and relax	
Week 15	- Unknowns of sleep - Future directions	- Work on paper	- Sleep Assessment paper due Nov 29 at 11:59 pm
Finals	Exam Week		- Final exam Wed Dec 7 at 1:30-4:10 pm