BILD 38 -- Winter Quarter 2021

Aging/Dementia/Neuroscience/Society

SYLLABUS

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CLASS MEETINGS: TuTh   11:00a-12:20p   Peterson 108

DISCUSSION SESSIONS: A01   W   2:00p-2:50p On-line (Evelio)
A02   W   4:00p-4:50p On-line (Caitlin)

COURSE WEBSITE: CANVAS

LIBRARY GUIDE WEBSITE: http://ucsd.libguides.com/bild38

COURSE DESCRIPTION

A goal of this course is to introduce students <u>who are not majoring in biology</u> to key ideas and basic information about **Human Neuroscience** that provide a basis for understanding the nature of and current treatments for brain diseases classified under the rubric **Dementia**. A second key goal is to explore how these diseases seriously **impact our Society** at many critical socioeconomic and ethical levels. Topics will include the fundamentals of human brain structure and function, the changes underlying brain development, maturation and normal aging, and degenerative neural diseases, particularly Alzheimer's but also others, whose prevalence in an aging population is creating an increasingly difficult healthcare load and tremendous social, political, ethical and legal impacts on our society.

> Our brains participate in every aspect of our lives, from simple bodily functions to our most abstract thoughts. Our identities are the sum of our stored memories and our interactions with our environments. How do *ensembles* of brain cells (neurons and glia) working together sense the environment and generate responses? Networks of neurons mediate sensation, movement, memory and other important higher functions, cognitive, affective and executive. What changes accompanying aging lead to dementia and how is biomedical research addressing these diseases and their grave consequences for the individual and for Society?

EXPECTATIONS

As a course offered by the Division of Biological Sciences, we will emphasize acquiring a general understanding of the biological and biomedical aspects of the subject while also considering human dementia in its societal context. As a non-majors course, there are <u>no specific course pre-requisites</u>, but enrolled students are expected to have a strong interest in the subject, enough to do a significant amount of outside reading and to explore current sources of information regarding dementia research, treatment, consequences and socioeconomic costs. <u>Students will be expected to read and report on current news about aging and dementia, and to carry out a team research project on a related area.</u>

STUDENT TEAMS

The course is designed to be highly interactive. Lectures will include questions to the students and plenty of time for discussion. Students will also work cooperatively, in teams of 4 students that will be formed during the first meeting of the discussion sections and become stable by the second week, when they will have chosen a team name.   Teams will collaborate on in-class exercises as well as on a research proposal (described below).

PRINCIPAL ASSIGNMENT: A RESEARCH PROPOSAL

A key part of the course is the preparation by each team of a Research Proposal, which the team will present to the class towards the end of the course (see Schedule). Many questions and ideas will arise as we (and your Team) discuss the various topics we will cover. Many of these questions have no easy answers, nor are there observations/data that would support specific answers. Your team's assignment will be to select one such question or idea, do a critical analysis of the relevant literature, and come up with an "experimental approach" for answering it.

Writing and submitting a Research Proposal is the process we undertake to obtain funds to carry out meaningful research in the natural and social sciences. A well-constructed proposal, to be submitted to a government agency (such as NIH or NSF) or to a private foundation (such as the Alzheimer's Association), has the following parts: (1) Question(s) to be addressed (hypothesis?), (2) Relevant background and significance (why is the question important? what is already known?), (3) Research Plan (how will relevant data be obtained and analyzed?), (4) Discussion and future directions (in light of possible answers). Further details of this assignment will be discussed in the first class.

DISCUSSION SECTIONS

Attendance to a Discussion Section is required. In the first two weeks, teams of 4 students will come together in each Section and begin to identify an area of common interest and a research topic for their Research Project. Teams will carry out their projects collectively, with all team members expected to contribute substantively. Each team will present and discuss their findings in their Sections prior to their class presentations in the last 2-3 weeks of the course. In addition, the Instructional Assistant(s) will discuss and respond to questions on the material covered in class

that will be included in the quizzes. Weekly News Reports may be discussed in Sections as well as in class.

READINGS/VIEWING

Textbook: NO specific text is required;

There are many textbooks in the Biomedical Library that cover the scientific and medical contents of this course, but generally in far more detail than we plan to cover them - you may like to consult these if you wish to explore the subject in more depth, but there is neither requirement nor suggestion that you should.

Papers: PDFs of papers will be posted on the course Canvas website for this course and URLs where reports and papers can be read or down-loaded will be assigned prior to some class periods. These readings will be required.

Web Videos: Many excellent lectures on basic human brain anatomy and brain function have been posted on the web. Some may be assigned for viewing prior to class so more time can be devoted to discussion.

EVALUATION/GRADING

Grades: Letter grades (F through A+) will be assigned on the basis of several performance criteria, including: (1) attendance and participation in discussion sections; (2) weekly news article assignments (described below); (3) grades in two out of three quizzes; and (4) a final oral presentation and written narrative of your Research Proposal.

1. Attendance and Participation: (10 points) Points will be awarded on the basis of attendance and participation in class/section discussions.

2. Weekly News Assignment (Weeks 1-6): (3 points per assignment, 18 points total) Every week each student must find a current news article that is related to the subject of the course and turn in a brief report (1-2 paragraphs, max 1 page) on Canvas summarizing the news item and how it is related to some aspect of aging and/or dementia. The source (URL) of the news article must be included in the report in order to

receive credit. Assignments submitted late will be given partial credit. Students may be asked to give a short summary of their news item in class.

3. <u>Quizzes</u>: (16 points each, 32 points total) There will be 3 <u>required</u> in-class quizzes, but only the 2 with the highest scores will count towards your grade. Quizzes will be on topics discussed in class as well as on readings. <u>There are no midterm or final exams in this course</u>.

   <u>Missed quizzes</u>: The only valid excuse for missing a quiz <u>that permits you to request a make-up exam</u> is a medical reason or a family emergency. Appropriate documentation is required.

4. <u>Team Project: Final Presentation</u>: (30 points) Every Team will give a 20 min (5 minutes each person) oral presentation to the entire class on the research topic of their choice. All students in the Team must participate in the oral presentation. <u>A PowerPoint File of the presentation must be turned in to Canvas by 5 pm the day prior to the scheduled presentation</u>.

5. <u>Team Project: Written Version</u>: (10 points) A single Word file (10-12 pages, including references) of the narrative of the oral presentation, written by all team members, must be turned in no more than 3 days after the oral presentation.

<u>Grades will be assigned on the basis of *total points earned*</u>:

   <u>91-100 points: A- to A+</u>
   <u>81-90 points: B- to B+</u>
   <u>71-80 points: C- to C+</u>
   <u>61-70 points: D</u>

CLASS SCHEDULE (topics/speakers may change for some dates)

CLASS/DATE   TOPIC

1. Jan 5   What is Dementia? Is There a Dementia Epidemic? Course Aims (EM)

2. Jan 7   The Magnitude and Multiple Impacts of Dementia on Human Society (EM)

3. Jan 12   Overview of the Human Brain: Anatomy and Functional Mapping, Neurons &
           Glia; Electrical and Chemical Signaling, Synaptic Circuits (EM)

4. Jan 14   Sensory and Motor Pathways; Brain Plasticity; Learning and Memory (EM)

5. Jan 19   Development and Aging of the Human Brain; the Concept of Wisdom (EM)

6. Jan 21   Healthy Aging: Maintaining Mental Agility (David Salmon)

7. Jan 26   Types of Dementia: Symptoms, Cognition, Diagnoses (David Salmon)

8. Jan 28   QUIZ # 1 --- On Materials Covered January 5 through January 21

9. Feb 2   CNS Imaging and Neurodegenerative Disease (Katherine Bangen)

10. Feb 4   Will there Be a Cure for Dementia Soon? (Howard Feldman)

11. Feb 9   Ethical Issues in Dementia Diagnosis and Care (EM)

12. Feb 11   Design of Healthcare Facilities for the Aging and the Cognitively Impaired (EM)

13. Feb 16   Discussion of Recent Literature on Healthy Aging and Dementia (EM)

14. Feb 18   QUIZ # 2 --- On Materials Covered Jan 26 through February 16

15. Feb 23   Work on Project Presentations in Class

16. Feb 25   Student Project Presentations and Discussion (ZOOM)

17. Mar 2   Student Project Presentations and Discussion (ZOOM)

18. Mar 4   Student Project Presentations and Discussion (ZOOM)

19. Mar 9   Student Project Presentations and Discussion (ZOOM)

20. Mar 11   QUIZ # 3 --- On Topics Presented February 25 through March 9

NO FINAL EXAM