

# INTRODUCTION TO ADRD: CLINICAL AND MECHANISTIC PRINCIPLES

GMS 6757 – FALL 2019

2 CREDITS

**CLASS LOCATION:** BMS Building, J480

**MEETING TIME:** Tuesday (3:00-3:50 PM); Wednesday (3:00-3:50 PM)

**COURSE DIRECTORS:**

Paramita Chakrabarty, PhD

Jose F. Abisambra, PhD

Email: pchakrabarty@ufl.edu

Email: j.abisambra@ufl.edu

Office: BMS J484; Phone: 352-273-7271

Office: BMS J491; Phone: 813-404-3697

## COURSE DESCRIPTION

Alzheimer's disease (AD) is now the third leading cause of death among older adults in the United States, with current estimates exceeding 5 million affected individuals in the United States alone. Along with other related dementias (referred to as AD related dementias or ADRD), this group of diseases has an immense toll on the general health and well-being of our nation's aging population. Despite intensive preclinical research and multiple currently active clinical trials assessing potential treatments for ADRD, there are still no disease modifying therapies. The overarching theme of this class is to provide a comprehensive knowledge base to our next generation of trainee scientists in order to enable them to tackle the clinical and translational complexities presented by ADRD.

This class, divided into two modules, incorporates a mix of didactic curriculum and discussion-based learning for graduate and professional students interested in a comprehensive overview of ADRD. The class covers specific themes that are designed to provide a comprehensive introduction to the topics most relevant to the study of ADRD. In addition to lectures, problem-based discussion and learning sessions are distributed throughout to offer deep analysis of key issues. These problem-based discussion sessions are specifically designed to promote broad discussion and maximize interaction between student trainees and faculty experts on these topics. The classes will be taught using the chapters from two textbooks as cited below, as well as other relevant reading materials. These reading materials will be selected from the current

primary literature relevant to the lecture theme. These articles will be assigned and distributed at least 2 weeks prior to the relevant lecture.

#### **RECOMMENDED COURSE TEXTBOOKS:**

- 1) Neurodegeneration: The Molecular Pathology of Dementia and Movement Disorders, 2nd Edition (2011) by Dennis Dickson (Editor), Roy O. Weller (Editor)
- 2) Animal Models for the Study of Human Disease, 2nd Edition (2017) by P. Michael Conn (Editor)

#### **PREREQUISITE KNOWLEDGE AND SKILLS:**

Students are expected to be familiar with basic neuroscience knowledge, including Alzheimer's disease. For a refresher in basic concepts of Alzheimer's disease, there are several free online resources, such as:

<https://nba.uth.tmc.edu/neuroscience/m/s4/chapter10.html>

[https://www.alz.org/national/documents/brochure\\_basicsofalz\\_low.pdf](https://www.alz.org/national/documents/brochure_basicsofalz_low.pdf)

<https://www.nia.nih.gov/health/alzheimers/basics>

## **LEARNING OBJECTIVES**

The broad learning objectives of this course are to:

- 1) Develop an overview of clinical symptoms, disease symptoms, and diagnostic criteria including biomarkers for ADRD patients
- 2) Critically assess the implications of "Big Data" and obtain insights into Alzheimer's risk genes, neurogenetics and gene-environment interactions as they relate to functional impairment in ADRD
- 3) Review the basic principles of drug design as it applies to ADRD preclinical research and clinical trials
- 4) Recognize and integrate the neuropathology of ADRD with basic neuroanatomical knowledge
- 5) Identify the various rodent and invertebrate models of ADRD and recognize the advantages and disadvantages of selecting experimental models
- 6) Identify basic concepts of cognitive dysfunction in aging and ADRD and appraise the characteristics in rodent models of ADRD
- 7) Participate in discussion-based learning to inculcate rigor, reproducibility transparency in experimental design in ADRD

## COURSE SCHEDULE

There will be two modules containing broad themes. Each theme will have two didactic lectures followed by a problem-based learning session. The topics that will be covered under each theme may need to be adjusted to enhance the class learning opportunity. The individual lecturers may exercise their discretion on individual learning topics, depending on their expertise or current breakthroughs that may have just occurred. If there are any changes in individual lectures, these will be communicated clearly to the students and justified. The overall themes and learning objectives will remain unchanged unless explicitly specified.

Module I			
Date	Theme	Topics Covered	Suggested Readings
20-Aug	Clinical Pathology and Neuropsychology:Part I	Patient interview based learning of clinical features of ADRD	Dickson et al: Chap 8
21-Aug	Clinical Pathology and Neuropsychology:Part II	Neuropsychology of ADRD and diagnostic guidelines	Dickson et al: Chap 8
27-Aug	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
28-Aug	Biomarkers in AD:Part I	Imaging biomarkers in ADRD	TBA from current literature
3-Sep	Biomarkers in AD:Part II	Proteomics-based biomarkers in ADRD	TBA from current literature
4-Sep	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
10-Sep	"Big Data" and Neurogenetics in AD: Part I	Data Science and Systems Biology in ADRD	TBA from current literature
11-Sep	"Big Data" and Neurogenetics in AD: Part II	Neurogenetics of ADRD	Dickson et al: Chap 9; Chap 6
17-Sep	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
18-Sep	Bench to Bedside:Part I	Principles of drug design	TBA from current literature
24-Sep	Bench to Bedside:Part II	Clinical trials in ADRD	Dickson et al: Chap 12
25-Sep	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
1-Oct	Neuropathology of ADRD Part I	Dissection of AD brain	Dickson et al: Chap 10
2-Oct	Neuropathology of ADRD Part II	Spectrum of neuropathology in ADRD	TBA from current literature
8-Oct	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
9-Oct	EXAM		
Module II			
Date	Theme	Topics covered	Suggested Readings
15-Oct	EN VxGENE in ADRD Part I	Basic concepts of gene-environment interaction in ADRD and aging	TBA from current literature
16-Oct	EN VxGENE in ADRD Part II	Recent findings and controversies	TBA from current literature
22-Oct	<i>SfN conference week</i>	<i>No classes</i>	
23-Oct	<i>SfN conference week</i>	<i>No classes</i>	
29-Oct	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
30-Oct	Genetically modified models of ADRD Part I	Rodent models of ADRD	Dickson et al: Chap 1, 2, 7; Conn et al: Chap 42; Chap 25
5-Nov	Genetically modified models of ADRD Part II	Drosophila, C elegans and zebrafish models of ADRD	Conn et al: Chap40
6-Nov	Genetically modified models of ADRD Part III	Modern approaches to brain transgenesis	Conn et al., Chap 27
12-Nov	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
13-Nov	Cognitive dysfunction Part I	Preclinical models of aging and ADRD	Conn et al: Chap 1
19-Nov	Cognitive dysfunction Part II	Practical approaches to selecting experimental models	TBA from current literature
20-Nov	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
26-Nov	Practical approaches to experimental design	Rigor, reproducibility, transparency and power analysis in AD research	Conn et al: Chap 1
3-Dec	<b>Problem based learning</b>	Interactive thematic discussion learning session	TBA from current literature
4-Dec	<i>Review</i>	<i>No classes; course directors available for office drop-ins</i>	
10-Dec	EXAM		

AD=Alzheimer's disease; ADRD=AD related dementias; TBA= To be Assigned

## GRADING POLICIES

Grades will be determined from performance on two written exams, class participation and class attendance.

### POINT DISTRIBUTION:

Two written exams, each worth 25 points	= 50%
Class participation, 40 points	= 40%
Class attendance, 10 points	= 10%

The written exams will consist of multiple choice questions and short answer questions. Class attendance will be assessed from leading at least one “problem-based learning” discussion session and active participation in all of these sessions, as well as class preparedness.

Final grades are determined by the scale below. Final grades will be computed on a straight scale (i.e., there is a potential for everyone to receive an A). An exception will be made if, after the final grade computations, fewer than 15% of students receive A's. In this instance, all grades will be curved upward so at least 15% of the students will receive A's.

#### **GRADING SCALE:**

(A)  $\geq$  93%; (A-) 90-92%; (B+) 87-89%; (B) 83-86%; (B-) 80-82%; (C+) 77-79%; (C) 73-76%; (C-) 70-72%; (D+) 67-69%; (D) 63-66%; (D-) 60-62%; (E)  $\leq$  59%

All grades assigned in this course will adhere to the UF grading policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

### **COURSE POLICIES**

**IMPORTANT DATES:** The final examination date(s) will be published online at the beginning of the semester. For all other dates (course registration dates, drop/add dates, holidays, etc.), please refer to <https://registrar.ufl.edu/soc/>.

**ATTENDANCE POLICY:** Class attendance is mandatory and will be part of the grade evaluation.

**QUIZ/EXAM POLICY:** There will be two written exams: a mid-term exam and a final comprehensive exam.

**MAKE-UP POLICY:** Students are fully responsible for any content missed due to unexcused absences. Students should meet with the instructors as soon as possible regarding University-excused absences so that accommodations can be made on a case-by-case basis. UF attendance policies are detailed in the following link: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

**ASSIGNMENT POLICY:** If individual projects are assigned by a lecturer, these must be completed and posted or turned in by the due date to obtain credit for the work.

**ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:** Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter, which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

**COURSE EVALUATIONS AND FEEDBACK:** Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. This evaluation is based on ten criteria. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

**ACADEMIC HONESTY:** UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructors in this class.

**INFORMATION ON STUDENT HEALTH AND WELL-BEING:** The University of Florida is committed to help students learn and thrive in a positive environment. The goal of the **U Matter, We Care** initiative (<https://umatter.ufl.edu/>) is to ensure that all students are supported on their path to academic success and overall well-being. For students in distress or in need of assistance, please reach out to the Care Team at [umatter@ufl.edu](mailto:umatter@ufl.edu). Additional help is available at the University Counseling & Wellness Center at 352-392-1575 or online at <https://counseling.ufl.edu/>.

## ABOUT THE LECTURERS

Paramita Chakrabarty, PhD, is an Assistant Professor of Neuroscience. Her research is on animal models of ADRD.

Jose Abisambra, PhD, is an Associate Professor of Neuroscience. He is interested in studying the cell biology of tauopathies.

There will be additional assigned lecturers for individual topics who will be selected based on their expertise in ADRD.