PHC 6937 Deep Learning Research (3 credits)

Semester: Summer B 2021
Delivery Format: On-Campus

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Class Meets: Wednesday (12:30pm-3:15pm) and Friday (12:30pm-4:45pm)

Office hours: WF, right after the lecture

Preferred Course Communications: e-mail (lucienq@ufl.edu)

Prerequisites: PHC 6068, PHC 6937 (Statistical Learning with Applications in Health Sciences), or the permission of the instructor.

Purpose and Outcome

Course Overview This course will learn deep learning methods and research skills that are necessary for new deep learning method development and modern data analysis.

Relation to Program Outcomes The methods and tools learned from this course can enhance students' ability in data analysis, method development, and professional advancement. Successful completion of this course fulfills one of the elective requirements for the MS and PhD programs in Biostatistics.

Course Objectives and/or Goals
* Comprehend important topics in deep learning
* Perceive key concepts (e.g., regularization) in deep learning
* Apply methods to health science and other areas
* Use different methods for various purposes (e.g., using deep neural networks for modeling non-linear relationship)

Description of Course Content

Topical Outline/Course Schedule
The course will cover major concepts and a variety of methods in deep learning. Tentative topics include deep feedforward networks, regularization, optimization, convolutional network, recurrent and recursive nets, autoencoders, and deep generative models.

Course Materials and Technology

The course is developed based on the following textbook, which is freely available online

Deep Learning

Statistical Software:

We will mainly use R in this course. R is free and you can download R from http://www.r-project.org/.
Rstudio is a recommended interface for the R software. It is also free and can be downloaded from http://www.rstudio.org.

For technical support for this class, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

Academic Requirements and Grading

Grading The course will be evaluated based on presentation (20%) and a research project (70%).
Professionalism (e.g., attendance and being involved in discussions) will account for 10% of the final grade.

Presentation Each student will be assigned 1-2 chapters related to the above topics, will be required to give a carefully review of assigned materials, and give a formal in-class presentation.

Research Project For the research project, each student will work on and present a project based on 1) the analysis of a real dataset using existing deep learning methods/software, or 2) developing a new method and evaluating the method via simulations and real data analysis. The grade is given based on the quality of the project (e.g., an innovative way of using an existing method), and the presentation of the project (i.e., delivering an easy-to-follow and informative talk).

Professionalism Students are required to attend the class on time. Cell phones should be silenced and laptops should be turned off during class unless needed. Students are also encouraged to be actively engaged in classes, asking questions and being involved in discussions.

The numerical final score will be converted to the letter grades according to the following scale and cutoffs:

Points Earned	Letter Grade
93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-

More information on UF grading policy may be found at:
http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades

Policy Related to Make up Work and Professionalism

Policy Related to Make up Work

Please note: Any requests for make-ups due to technical issues MUST be accompanied by the UF Computing help desk (http://helpdesk.ufl.edu/) correspondence. You MUST e-mail me within 24 hours of the technical difficulty if you wish to request a make-up.

Policy Related to Professionalism
Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Excused absences must be consistent with university policies in the Graduate Catalog (http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance). Additional information can be found here: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Student Expectations, Roles, and Opportunities for Input

Expectations Regarding Course Behavior
Students are expected to show up for class prepared and on time. Cell phones are to be silenced during class unless there is an emergency, in which case please inform the instructor.

Communication Guidelines

The preferred methods of communication for the course are messages in e-learning or e-mail.

Academic Integrity

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

 "**We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity**."

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For

additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/

http://gradschool.ufl.edu/students/introduction.html

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Online Faculty Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/ . Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Policy Related to Guests Attending Class

Only registered students are permitted to attend class. However, we recognize that students who are caretakers may face occasional unexpected challenges creating attendance barriers. Therefore, by exception, a department chair or his or her designee (e.g., instructors) may grant a student permission to bring a guest(s) for a total of two class sessions per semester. This is two sessions total across all courses. No further extensions will be granted. Please note that guests are **not** permitted to attend either cadaver or wet labs. Students are responsible for course material regardless of attendance. For additional information, please review the Classroom Guests of Students policy in its entirety. Link to full policy: http://facstaff.phhp.ufl.edu/services/resourceguide/getstarted.htm

SUPPORT SERVICES

Accommodations for Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting https://disability.ufl.edu/students/get-started/ . It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: http://www.counseling.ufl.edu. On line and in person assistance is available.

- You Matter We Care website: http://www.umatter.ufl.edu/. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.

- The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: https://shcc.ufl.edu/

- Crisis intervention is always available 24/7 from:
  Alachua County Crisis Center:
  (352) 264-6789
  http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Inclusive Learning Environment

Public health and health professions are based on the belief in human dignity and on respect for the individual. As we share our personal beliefs inside or outside of the classroom, it is always with the understanding that we value and respect diversity of background, experience, and opinion, where every individual feels valued. We believe in, and promote, openness and tolerance of differences in ethnicity and culture, and we respect differing personal, spiritual, religious and political values. We further believe that celebrating such diversity enriches the quality of the educational experiences we provide our students and enhances our own personal and professional relationships. We embrace The University of Florida's Non-Discrimination Policy, which reads, "The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act." If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see your instructor or refer to the Office of Multicultural & Diversity Affairs website: www.multicultural.ufl.edu.