

**University of Florida**  
**College of Public Health & Health Professions Syllabus**  
**PHC 3793 Higher Thinking for Healthy Humans:**  
**AI in Healthcare and Public Health**  
 (3 credit hours)  
 Semester: Fall 2022  
 Tuesdays 1:55 - 3:50 PM  
 Delivery Format: On-Campus/In-person  
 Location: HPNP G-114

**Instructor Name:** Aprinda Indahlastari, PhD

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**Office Hours (Zoom only):** Wednesdays 11a-12p and Thursdays 11a-12p, or by appointment

- <https://ufl.zoom.us/my/aprindaindahlastari>

**Canvas URL:** <http://elearning.ufl.edu/>;

**Preferred Course Communications:** Messages via Canvas, UFL email

**Prerequisites** STA2023 or equivalent; or permission from instructor

## PURPOSE AND OUTCOME

**Course Overview.** This course covers a broad overview and introductory level of history, foundational concepts, and methods on artificial intelligence (AI), focusing on public health and healthcare applications, including hands-on practice on graphical/high-level AI software. The course neither provides advanced statistical/machine learning training nor programming.

**Relation to Program Outcomes.** This course contextualizes historical and methodological topics of AI into public health, healthcare, and their research applications. The course enriches our educational program covering 'next-generation data science', in compliance to up-to-date accreditation standards, and with translational relevance to public health, healthcare, and professional practice.

**Course Objectives and/or Goals.** This course has the objective to provide the students the foundations of AI methods and application including examples in public health and healthcare, and to get them acquainted with high-level AI software for data analysis and visualization. Upon successful completion of the course, students will be able to:

- Explain the history of AI and machine learning in relation with classical statistics;
- Give examples of basic AI methodologies and discuss where they are best utilized in Public Health and Healthcare;
- Evaluate the performance of AI models in health settings and validate their appropriateness;
- Describe the health implications/issues related to AI modelling and presence of bias, addressing the concepts of causal AI;
- Summarize typical use cases and applications of AI in Public Health and healthcare;
- Utilize high-level graphical AI software to execute a machine learning pipeline for a health-related intervention so that an analysis can be completed.

Knowledge-based goals according to Bloom's taxonomy of educational objectives:

1. *Knowledge.* Recognition of machine learning / AI techniques, e.g. "What is a recurrent neural network?"
2. *Comprehension.* Ability to understand the intended use of AI methods, e.g. "Can a recurrent neural network be used to predict whether a tumor is benign or malignant?"
3. *Application.* Ability to use AI methods in a specific context, e.g. "Can we apply an AI method to identify a possible causal structure from the given data?"

4. *Analysis*. Ability to draw conclusions using data and AI models, e.g. “Can we visualize the socio-demographic clusters found by the AI algorithm on the data, and evaluate if they are associated to different health outcomes?”
5. *Evaluation*. Ability to use the AI modelling for translational purposes, e.g. “After simulating several public health intervention scenarios with the deep learning model, we conclude that the best strategy according to the resource constraints is...”
6. *Synthesis*. Ability to decide if the AI pipeline is adequate for a problem of interest, e.g. “For this prediction problem, we conclude that a linear regression is a better choice than a deep learner because it has similar performance, but it is more interpretable.”

**Instructional Methods.** The course will be divided into in-person class sessions (once per week) and supplemented with online lectures and content through a blended learning approach. The online content delivery will be through the course’s Canvas site. Course materials and assignment may include homework and critical reading of scientific papers. Teaching materials/links will be posted online. All course slides will be made available online for download. The online material (including this syllabus) will be processed through SensusAccess to make sure it is compliant to Federal, State and University’s accessibility policies and governance.

## DESCRIPTION OF COURSE CONTENT

### Topical Outline/Course Schedule

The first majority of the semester is dedicated to AI theory and fundamental concepts, the remaining will cover real life applications in public health and healthcare with guest lectures from experts in the field.

Class schedule:

Week	Date	Topic	Assignment
1	Aug-30	Course introduction and overview	HW 1 out
2	Sept-6	History of AI and healthcare data	HW1 due (9/5); HW2 out
3	Sept-13	Machine learning introduction	HW2 due (9/12); HW3 out
4	Sept-20	SVM; k-nearest neighbor	HW3 due (9/19); HW4 out
5	Sept-27	Tree-based methods (decision trees & random forests)	HW 4 due (9/26); HW5 out
6	Oct-4	Clustering (hierarchical & k-means)	HW5 due (10/3); HW6 out
7	Oct-11	Dimensionality reduction; association	HW6 due (10/10)
8	Oct-18	EXAM 1	
9	Oct-25	Reinforcement learning; CBR	HW7 out
10	Nov-1	Artificial neural networks & deep learning	HW7 due (10/31); HW8 out;
11	Nov-8	AI bias and causal inference	HW8 due (11/7)
12	Nov-15	Natural language processing	
13	Nov-22	Weka Q&A	
14	Nov-29	Use cases of AI for public health application	Pipeline Assignment Due (11/29)
15	Dec-6	EXAM 2	
16	Finals week	No Class	

## Course Materials and Technology

**Course slides.** Provided by the course instructor and posted online.

**Textbook(s):** None mandatory. Recommended (optional) freely available online textbooks/resources: “Introduction to Statistical Learning” (<https://www.statlearning.com/>) and “Deep Learning” (<https://www.deeplearningbook.org/>).

**Reading materials.** Provided by the course instructor and posted online.

**Hardware:** Webcam and Microphone may be required for out-of-class activities. We may use laptop built in webcams and students may be required to move camera during use. Additional technical requirements are outlined at <http://publichealth.php.ufl.edu/tech/>.

**e-Learning in Canvas site:** There will be an online site for this course in Canvas, the learning management system supported by the University. Log in at <https://lss.at.ufl.edu/> and go to course site for PHC3793: Fall 2022. The syllabus, out-of-class course content, assignments, and other course materials will be posted here. The course site will also allow for discussions/chats among the students and course leaders. You will also turn in assignments through this site. It will be your responsibility to check the site on a routine basis to keep up with announcements, emails, and content modifications.

**Software.** Weka (<https://www.cs.waikato.ac.nz/ml/weka/>).

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

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

## ACADEMIC REQUIREMENTS AND GRADING

### Weekly Homework (30 points, 6 X 5 points each, 30% of Total Grade)

Each week (except for weeks 8-9, 12-16), a case or problem set will be assigned (8 total assignments, dropping the lowest two scores for a total of 6 at 5% each, equal to 30% of total grade). Assignments will include but not limited to multiple choice, matching, short answers, and interpreting results. Homework write-ups and related files will be turned in electronically via the Canvas e-learning system.

### Pipeline Assignment (10 points, 10% percent of Total Grade) - Due November 29

Implement and execute properly a machine learning pipeline in Weka. Data are assumed to be already formatted, and the student will perform correct pipelining of commands to perform data analysis. The submission of this assignment will contain a fully generated model, data output, and a brief report as attachment in Canvas. This assignment counts for 15% of the total grade. Students are encouraged to consult one another on problems and programming issues, but ***everyone should perform their own programming and write-ups and turn in their own work; no copying is permitted.***

### Exam 1 (25 points, 25% of Total Grade) - October 18

Students will take a 25-question exam. The exam will take place during the normally scheduled class time. You will need to bring a laptop or other device to access the exam via Canvas. Questions will address the content in the online materials (asynchronous) as well as class lectures and discussions (synchronous) and

will be in the form of multiple choice, fill-in-the-blank, matching, and short answer (technical/methodological questions and applied/discussion questions). The exam will cover all content included in Weeks 1 through 7. The exam will require the lockdown browser provided via Canvas.

### Exam 2 (25 points, 25% of Total Grade) - December 6

Students will take a 25-question exam. The exam will take place during the normally scheduled class time. You will need to bring a laptop or other device to access the exam via Canvas. Questions will address the content in the online materials (asynchronous) as well as class lectures and discussions (synchronous) and will be in the form of multiple choice, fill-in-the-blank, matching, and short answer (technical/methodological questions and applied/discussion questions). The exam will cover all content included in Weeks 9 through 14. The exam will require the lockdown browser provided via Canvas.

### In-class Participation (10 points, 10% of Total Grade)

In addition to live lectures, we will be incorporating in-class active learning approaches by using interactive and discussion-based activities. Students are expected to be engaged during the class and participate in pair, small group, and class discussions. Example activities will include problem solving/analysis, peer-peer interaction, paper reading/synthesis, small group activities, case studies, and similar.

### Extra Credit (no more than 5%)

Extra Credit opportunities will be available throughout the semester at the discretion of the instructor.

### Grading

Requirement	Due date	Points or % of total grade (% must sum to 100%)
Weekly Homework	Mondays at 11:59PM	30 Points (6 x 5-points each) 30% of Total Grade
Pipeline Assignment	November 29, 11:59PM	10 Points, 10% of Total Grade
Exam 1	October 18	25 Points, 25% of Total Grade
Exam 2	December 6	25 Points, 25% of Total Grade
Class Participation	In-class (live lecture)	10 Points, 10% of Total Grade

Point system used (i.e., how do course points translate into letter grades).

<b>Points earned</b>	93.0-100	90.0-92.9	87.0-89.9	83.0-86.9	80.0-82.9	77.0-79.9	70.0-76.9	67.0-69.9	63.0-66.9	60.0-62.9	Below 60
<b>Letter Grade</b>	A	A-	B+	B	B-	C+	C	D+	D	D-	E

<b>Letter Grade</b>	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	WF	I	NG	S-U
<b>Grade Points</b>	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0	0.0	0.0	0.0	0.0

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at: <http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

## Course Policies

### Late Assignments

Each late assignment will receive a penalty of 25% deduction per day from the total correct score.

**Special Circumstances.** In the event of exceptional situations that may interfere with your ability to perform an assignment or meet a deadline, contact the instructor as soon in advance of the deadline as possible. Such cases will be dealt on an individual, case-by-case basis.

Absences should be discussed with the instructor in advance when possible. Late arrivals and early departures are discouraged, as they have the potential to disrupt the class. However, extenuating circumstances occur and sometimes these things are necessary. If necessary, please make such instances as minimally disruptive as possible out of courtesy to the rest of the class.

Please note: Any requests for make-ups due to technical issues should be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail the instructor and TA, as applicable, within 24 hours of the technical difficulty if you wish to request a make-up.

### Policy Related to Make up Work

Make-up work will be determined on a case-by-case basis. Please send an email to the instructor.

Please note: Any requests for make-ups due to technical issues should 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 Required Class Attendance

All faculty are bound by the UF policy for excused absences. For information regarding the UF Attendance Policy see the Registrar website for additional details: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Attendance at all scheduled course activities is expected. Additionally, students will be responsible for additional out-of-class activities as part of a partially blended classroom environment (described above). Further, the assignments outlined will be completed outside of class. Students will be required to meet with their term project groups outside of class and may find it beneficial to attend other events or have additional scheduled meetings, depending on the topic selected by their working group outside of the in-person course meetings.

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>

### 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>

## STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

### Communication Guidelines

The communication guidelines are a collaborative agreement between the all of the students and the instructor (and TA, as applicable). Email messages are expected to be sent through UF email or the Canvas system. Students should expect a response within 2 business day (48 hours).

*Announcements:* Class announcements will be sent via the announcements tool in eLearning. Depending on your CANVAS notification settings, you may or may not be notified via email; you are responsible for all information in these announcements whether or not you see them in your email.

Further, please see the university's Netiquette Guidelines:

<http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

### 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/>.

## 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>. Online 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](http://www.multicultural.ufl.edu)