<u>**ELEG 4103-P06: Machine Learning**</u>

**Department of Electrical and Computer Engineering
Roy G. Perry College of Engineering
Prairie View A&M University
Fall 2018**

Pre-requisites:

      Consent of instructor: *Students have basic programming skills and are able to complete projects with programming languages such as Python, C/C++, C#, and Java independently. In addition, it is expected that students are familiar with probability, linear algebra, and calculus.*

Textbook (required):

      An Introduction to Machine Learning, by Miroslav Kubat, Springer International Publishing, 2017.
ISBN: 978-3319348865

References:

      Machine Learning: A Probabilistic Perspective, by Kevin Murphy, MIT Press, 2012.
ISBN: 978-0262018029

      Pattern Recognition and Machine Learning*,* by Christopher M. Bishop, Springer-Verlag New York, 2006.
ISBN: 978-0387310732

Instructor:

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Office Hours:

      MR 10:30AM-12:30 PM, T 10:00AM-12:00 PM, and by appointment

Lectures:

      TR 5:00-6:20 PM, NENR 223

Course Objectives:

Machine Learning enables computer systems to learn from data to complete specific tasks, without being explicitly programmed. Artificial Intelligence is promoted significantly with the development of machine learning. It is critical for students to gain fundamental knowledge in this exciting emerging field. This course will cover the underlying theory, the range of applications to which machine learning has been applied, learning from data sets, and evaluating learned models. For example, this course will cover supervised learning and unsupervised learning, as well as methods to complete feature extraction and sampling. In addition, this course will involve constructing machine learning models on embedded systems as well as basic knowledge of building deep learning models. This course will also train students programming skills with Python and use open-source software such as TensorFlow to gain hands-on experiences.

The course will cover the following materials (a tentative outline is given below; however, the exact time spent on a subject my vary):

- Week 1: Introduction to Machine Learning

- Week 2: Introduction to Python

- Week 3: Feature Selection and Sampling

- Week 4: Bayesian Classifiers

- Week 5: Nearest-Neighbor Classifiers

- Week 6: Linear and Polynomial Classifiers

- Week 7: Decision Tree

- Week 8: Midterm Exam

- Week 9: Ensemble Learning

- Week 10: Unsupervised Learning

- Week 11: Artificial Neural Networks

- Week 12: Introduction to Deep Learning

- Week 13: Introduction to TensorFlow

- Week 14: Convolutional Neural Networks and Recurrent Neural Networks

- Week 15: Machine Learning on Embedded Systems

- Week 16: Projects Demonstration

Grading:

Homework	20%
Midterm Exam	30%
Projects	50%
Total	100%

Any deviation from the above grading policy will be discussed in advance with the class. Such deviations will be considered only in situations to provide learning enrichment opportunities for the entire class.

Assignments:

Projects and other assignments will be assigned to test the ability of solving problems with the knowledge learned from this course. Students will be required to turn in and demonstrate the projects. Projects have to be handed in *on time*. Late projects will *not* be accepted unless due to acceptable reasons (as defined by University policy). *Due to the accreditation requirements, students are required to submit their works through ecourses*: http://ecourses.pvamu.edu

Taskstream:

Taskstream is a tool that Prairie View A&M University uses for assessment purposes. One or more of your assignments may be required for submission as an "artifact," an item of coursework that serves as evidence that course objectives are met. More information will be provided during the semester, but for general information, you can visit Taskstream via the link in ecourses.

Exam Policy:

Exams are close-book and close-notes. Every student must take all exams on the assigned dates. Any student who misses an exam without a valid excuse will automatically receive zero for that exam. Make-up exams will be administered in accordance with university policy.

Computer Usage:

C/C++, Python, plus additional software such as TensorFlow and Jupyter, will be used in the class. It will allow the students to practice the theory and techniques in machine learning through hands-on experiences.

Electronic Devices Policy:

Cell phones are restricted during class. Cell phones must be turned off during the lectures and must *not* be used during exams. If your cell phone rings during class, you may be asked to leave. Other devices (computers, recorders, etc.) may be allowed, but you must ask the instructor before you use them during class.

Student Support and Success

John B. Coleman Library

The library and its partners have as their mission to provide resources and instructional material in support of the evolving curriculum, as a partner in Prairie View A&M University's mission of teaching, research, and service and to support the University's core values of access and quality, diversity, leadership, relevance, and social responsibility through emphasis on ten key areas of service. It maintains library collections and access both on campus, online, and through local agreements to further the educational goals of students and faculty. https://www.pvamu.edu/library/ Phone: 936-261-1500

University Tutoring Center

The Center offers tutoring via peer tutoring. The services include workshops (i.e., Save My Semester, Recalculate Your Route), seminars (i.e., Tools You Can Use: TI-84), group review sessions (i.e., College Algebra Topic Reviews, GRE Preparation), group study opportunities (i.e.,

TSIA, HESI, Study Break, Exam Cram), and test-taking strategies (How to take Notes, Study Buddy, 5 Day Study Guide). The Learning Curve is a nationally certified tutoring program through the National Tutoring Association. The peer tutors are trained and certified by the coordinator each semester. Location: J.B. Coleman Library Rm. 307. Phone: 936-261-1561

The Student Academic Success Center

The Student Academic Success Center is designed to help Prairie View students in their second year and beyond navigate towards graduation by providing the following services: Academic Advisement, Targeted Tutorials for Personalized Learning, Campus-Wide Referrals, and Academic & Social Workshops. Location: J.B. Coleman Library Rm. 306. Phone: 936-261-1040

Writing Center

The Writing Center provides student consultants on all aspects of the writing process and a variety of writing assignments. Writing Center consultations assist students in such areas as prewriting, brainstorming, audience awareness, organization, research, and citation. Students taking on-line courses or courses at the Northwest Houston Center or College of Nursing may consult remotely or by email. Location: Hilliard Hall Rm. 121. Phone: 936-261-3724

Student Counseling Services

The Student Counseling Services unit offers a range of services and programs to assist students in maximizing their potential for success: short-term individual, couples, and group counseling, as well as crisis intervention, outreach, consultation, and referral services. The staff is licensed by the State of Texas and provides assistance to students who are dealing with academic skills concerns, situational crises, adjustment problems, and emotional difficulties. Information shared with the staff is treated confidentially and in accordance with Texas State Law. Location: Owens-Franklin Health Center Rm. 226. Phone: 936-261-3564

Testing

The Department of Testing administers College Board CLEP examinations, the HESI A2 for pre-nursing majors, LSAT for law school applicants and MPRE for second-year law students, the Experiential Learning Portfolio option, the Texas Success Initiative (TSI) Assessment, which determines college readiness in the state, and exam proctoring, among other service such as SAT and ACT for high school students. Phone: 936-261-3627

Office of Disability Services

As a federally-mandated educational support unit, the Office of Disability Services serves as the repository for confidential disability files for faculty, staff, and students. For persons with a disability, the Office develops individualized ADA letters of request for accommodations. Other services include: learning style inventories, awareness workshops, accessibility pathways, webinars, computer laboratory with adapted hard and software, adapted furniture, proctoring of non-standardized test administrations, ASL interpreters, ALDs, digital recorders, livescribe, Kurtzweil, and a comprehensive referral network across campus and the broader community. Location: Evans Hall Rm. 317. Phone: 936-261-3585

Veteran Services

Veterans Services works with student veterans, current military and military dependents to support their transition to the college environment and continued persistence to graduation. The

Office coordinates and certifies benefits for both the G.I. Bill and the Texas Hazlewood Act. Location: May Hall Rm. 118. Phone: 936-261-3563

Office for Student Engagement

The Office for Student Engagement delivers comprehensive programs and services designed to meet the co-curricular needs of students. The Office implements inclusive and accessible programs and services that enhance student development through exposure to and participation in diverse and relevant social, cultural, intellectual, recreational, community service, leadership development and campus governance. Location: Memorial Student Center Rm. 221. Phone: 936-261-1340

Career Services

Career Services supports students through professional development, career readiness, and placement and employment assistance. The Office provides one-on-one career coaching, interview preparation, resume and letter writing, and career exploration workshops and seminars. Services are provided for students at the Northwest Houston Center and College of Nursing in the Medical Center twice a month or on a requested basis. Distance Learning students are encouraged to visit the Career Services website for information regarding services provided. Location: Evans Hall Rm. 217. Phone: 936-261-3570

University Rules and Procedures

Disability Statement (Also See Student Handbook):

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Evans Hall, Room 317, or call 936-261-3585/3.

Academic Misconduct (See Student Handbook):

You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

Forms of Academic Dishonesty:

1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.

2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.

3. Fabrication: use of invented information or falsified research.

4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else's words, ideas, or data as one's own in work submitted for credit. Failure to identify information or

essays from the Internet and submitting them as one's own work also constitutes plagiarism.

Nonacademic Misconduct (See Student Handbook)

The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

Sexual Misconduct (See Student Handbook):

Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

Title IX Statement

Prairie View A&M University (PVAMU) is committed to supporting students and complying with the Texas A&M University System non-discrimination policy. It seeks to establish an environment that is free of bias, discrimination, and harassment. If you experience an incident of sex- or gender-based discrimination, including sexual harassment, sexual assault or attempted sexual assault, we encourage you to report it. While you may talk to a faculty member about an incident of misconduct, the faculty member must report the basic facts of your experience to Ms. Alexia Taylor, PVAMU's Title IX Coordinator. If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are individuals who can meet with you. The Title IX Coordinator is designated to handle inquiries regarding non-discrimination policies and can assist you with understanding your options and connect you with on- and off-campus resources. The Title IX Coordinator can be reached by phone at 936-261-2123 or in Suite 013 in the A.I. Thomas Administration Building.

Class Attendance Policy (See Catalog for Full Attendance Policy)

Prairie View A&M University requires regular class attendance. Attending all classes supports full academic development of each learner whether classes are taught with the instructor physically present or via distance learning technologies such as interactive video and/or internet.

Excessive absenteeism may result in a student's course grade being reduced or in assignment of a grade of "F". Absences are accumulated beginning with the first day of class during regular semesters and summer terms.

Student Academic Appeals Process

Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.