Artificial Intelligence
Spring 2020
Lane Department of Computer Science and Electrical Engineering

Course Syllabus

Instructor: *Don McLaughlin*
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Office: *303 Advanced Engineering Research Building*
Office hours: *2:00 PM –3:00 PM Tuesday and Thursday (other hours available by appointment)*
Location: *Room 135 Advanced Engineering Research Building*

Class Meeting Time: 5:00 PM – 6:15 PM Tuesday, Thursday – AER 135

Course Abstract: This course is an introduction and overview of field of artificial intelligence (AI). It focuses on general and specific theories of artificial intelligence and will delve into a number of specific domains of machine intelligence. The course will provide the opportunity to develop sample AI applications and to design and develop a full-fledged AI application.

Course Goals: The goals of this course are, at the completion of the course and the activities that are associated with the course, the successful student should:

- Have an understanding of the general and specific theories of artificial intelligence.
- Have an understanding of the various domains of artificial intelligence.
- Have an understanding of the general design principles for developing AI applications in several AI domains.
- Explore, in depth, one or more AI domains or frameworks.
- Be able to design, code and implement AI applications in several AI domains.
- Be able to consider the philosophical and social implications of artificial intelligence in society.

Knowledge and skills in this course will be developed through participation in class lectures and discussion, reading assigned texts and non-assigned resources, conducting independent research, completing various assignments or projects, the design, implementation and demonstration of an AI application. Knowledge and skills developed in this course will be demonstrated by students through the completion of assigned projects, the completion of a course project, the performance of project demonstrations, performance on course tests and examinations and participation in class discussions and activities.

Course Prerequisites: knowledgeable in one or more procedural programming languages (Python, C,C++,…); also CS 220 and CS 111. The primary programming language used in this course is Python. Other languages may be used in specific situations. Familiarity with discrete mathematics, including, relational algebra, graph theory, Boolean algebra and linear algebra will be needed to complete this course.

Required Texts:

Artificial Intelligence: A Modern Approach (3rd Edition) Hardcover – December 11, 2009 by Stuart Russell (Author), Peter Norvig (Author) ISBN-13: 978-0136042594 ISBN-10: 0136042597 Edition: 3rd

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition – October 2019 by Aurélien Géron (Author) ISBN-13**:** 978-1492032649 ISBN-10**:** 1492032646

Artificial Intelligence: Foundations of Computational Agents 2nd Edition 2017 by David L. Poole (Author), Alan K. Mackworth (Author) ISBN-10: 0521519004 ISBN-13: 978-0521519007 http://artint.info/index.html

THE NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN, Office of Science and Technology Policy **-** National Science and Technology Council, Networking and Information Technology Research and Development Subcommittee, June 2019 https://www.nitrd.gov/pubs/National-AI-RD-Strategy-2019.pdf

Plus: Additional and Supplemental materials as defined by the instructor

Course Topics: Generally, this course will include the topics listed below. The actual topics covered may evolve somewhat over the semester based on the need to elaborate, expand or focus on specific issues and subtopics.

- Overview of course, course syllabus and requirements
- History and background of AI
- Ethics and social implications of AI
- Intelligent Agents
- Problem solving
- Knowledge and knowledge representation
- Reasoning and reasoning with uncertainty
- Machine learning
- Machine vision and perception
- Robotics

Course Format: This course will be conducted, to a large degree, in a lecture/discussion format. Primarily that means that the course requires an engaged participation on the part of the student. In addition to assigned readings, lectures and exercises, learning will occur through active discovery, discussion and independent investigation. Individual and team projects will be an important part of this course. On occasion class lectures and discussion may be conducted remotely via ecampus or other on-line tools.

Note: This is a dynamic document. This document and related course documents will change periodically throughout the semester. Students should check the course site on eCampus on a regular basis for updates and revisions to this and other course materials.

Course Requirements: Students must read and study identified reading materials and course resources on a weekly if not daily basis. Students will also meet with the class at scheduled weekly meeting times, as well as participate in course discussions and activities. Additionally, students must complete and submit to the instructor or satisfy the following:

- 5 homework assignments
- 3 "unit" tests
- Class participation
- Evidence of project participation
- 14 short quizzes
- A term project with demonstration

Term Project: Students will be assigned to teams to design, develop, test, demonstrate and submit an AI application. Student teams will select project topic areas from a provided list. Teams must define the scale, scope and problem focus of the selected topic. The teams must then develop and execute a project plan. Project teams are required to meet outside of class as least once per week for a minimum of one hour per week. All members of these teams must be present for these meetings. Also, every week each team must present, in class, a project progress report to the rest of the class. The term project will culminate with a presentation and working demonstration delivered to the class and, possibly, others.

Quizzes: This course will have frequent quizzes. These quizzes will be short, usually one to five questions. The subject matter of these quizzes will usually be based on content discussed in the previous regular lecture or discussion or on the currently assigned study material. As noted elsewhere in this document quizzes may not be made up for any reason, and they may not be turned in late.

Performance Evaluation: Student performance in this course will be evaluated based on the successful completion of all course projects and assignments, active engagement in course discussions and activities, and the results of quizzes sand examinations.
In general, the earned grade in the course will be based on the calculated total points according to the following schedule:

Activity or Task	Max Point Value	Total Points Possible
Homework Projects	10 (*5)	50
Tests	50 (*3)	150
Class Participation	50	50
Short quizzes	10*14	100
Term Project Participation	13*5	75
Term Project Planning and Development	13*5	75
Term Project	100	100
Total		600

Homework will be due by the posted date and time as assigned. In most cases homework assignments will not be accepted after the assigned deadline, unless there is a prior arrangement with the instructor. Late assignment submissions may result in a reduction in assignment grade points.

The overall course performance will be determined based on a total of the points for the activities or tasks described above. An earned letter grade will, then, be assigned based on the following table:

Point value	Earned Letter Grade
>=540	A
479>540	B
419>480	C
359>420	D
<360	F

Attendance Policy: Class attendance is not required, per se. However, lectures and class discussions are important parts of the learning process in this class and, as such, students are required to participate in class lectures and discussions. Students are required to attend and participate in team meetings, team presentations and project team work. It should also be noted that students will be responsible for course material and information that may be conveyed through lectures and class discussion whether or not that material or information is contained in handouts, instructor provided notes, or assigned or optional readings. Students should also note that a significant portion of the course content will be conveyed through readings, class lectures, in-class activities and class discussions.

Class conduct: conduct or behavior in the classroom or meeting spaces should always support the use of such spaces as productive learning environments. In part this means that everyone participating in this class must refrain from activities that would distract or disrupt students, the instructor or guests, or otherwise interfere with the delivery of the educational mission of this course. Students in this class are responsible for keeping the classroom, meeting and work spaces neat and tidy.

Important note: Missed quizzes may not be made up. Examinations may only be made up with an excused absence, which must be requested and approved before the exam.

Academic Integrity Policy: The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code (http://studentlife.wvu.edu/office_of_student_conduct/student_conduct_code). Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.
Students are expected to adhere to all University standards for academic integrity and honesty. Please see the WVU statement on Academic Integrity. Unless instructed otherwise students may confer with each other to identify resources for problem solutions, test preparation and project development. However, all students are, unless instructed otherwise, required to carryout homework assignments, take examinations and complete class projects independently. Copying and submitting the work of others, in part or whole, or the use of unapproved reference materials during examinations will be considered a violation of this course's academic integrity policy. Any single violation of the academic

integrity policy by a student will result in an automatic score of zero for the activity in which the violation occurred. A second violation by the same student may result in a grade of F for the course for that student. Students are responsible to refrain from sharing homework, test responses and project components with others students. In cases where students submit the work of others, whether homework, test responses or projects, both the originator and the submitter may be charged with an academic integrity violation.

Students are also expected to adhere to conventional standards regarding the published and unpublished works of others. In particular, all works of others used by students in this course must be appropriately attributed and cited.

Electronic Communications Policy: WVU MIX email addresses will be the official student email addresses used in this course. All email communications between the instructor and class participants (individually or the class as a whole) will be done using MIX addresses. Homework or project submissions made using something other that WVU MIX and not received by the instructor will be treated as "not-submitted". Note: most assignments should be submitted through **eCampus**. Email to the instructor should use the email address listed at the top of this syllabus.

All student email must use their WVU assigned email ID for all email communications and, and when necessary, homework/project submissions.. Normally, homework and other assigned submissions must be submitted through ecampus, unless otherwise advised by the instructor. eCampus and the respective eCampus site for this course will be the official website for this course. This eCampus site will serve as a core communications facility for this course. Students should log-on and check this website on a daily basis. Students are also strongly advised to check their email every day. Notices, announcements and course related information will be disseminated through email or on the eCampus course site.

Inclusivity: The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu.

Homework and Project Submissions: All homework, reports and project submissions must (unless previously approved or directed by the instructor) be done through this course's eCampus website or in unusual cases by electronic mail as directed by the instructor. All course material email submissions must include the course name (CS472) and the specific submission title in the subject line of the email message. For example, homework exercise number one would be submitted with **CS472 Homework 1** as the subject line. The submission, then, will typically be included as an attachment or uploaded.