COMP1100 - The Power of AI: Fundamentals to Applications

Course Description: A comprehensive introduction to artificial intelligence accessible to students across all disciplines. Addresses fundamental principles of AI, key concepts like knowledge representation, reasoning, machine learning, natural language processing, and neural networks. Topics such as AI's impact across various fields, critical analyses of the benefits and limitations of the state of the art, ethical considerations, and hands-on experience in leveraging AI technologies will be covered.
Prerequisite(s): None.
Credit Hours: 3

Course Objectives:
At the completion of this course, students will be able to:

1. Understand the core principles that form the foundation of AI technologies.
2. Delve into essential AI topics such as knowledge representation, reasoning, machine learning, and natural language processing.
3. Examine how AI is transforming various industries and its potential future implications.
4. Address the ethical issues related to AI, including privacy, bias, and the broader societal impacts.
5. Conduct critical analyses of the benefits and limitations of current AI technologies and methodologies.
6. Engage with practical activities to apply AI technologies and tools, enhancing your understanding through real-world applications.

Course Staff:

Instructor: Vishalini Ramnath, Office: 3139A Shelby Center
Email: vlr0013@auburn.edu

Course meetings:
Lecture: Shelby 1103, 01:00 pm to 01:50 pm

Tutoring: Provided by the College of Engineering:
`http://eng.auburn.edu/current-students/academic-support/index.html`
Help and tutoring: TA who will be able to help you not only with the assignments but also with the topics being covered in lecture. Instructor and TA office hours are available for individual help but should be used for focused questions that can be addressed fairly quickly. For help that may require more time, you should make an appointment outside of office hours. In addition to course level help, the College of Engineering provides tutoring support for this course through Engineering Student Services.

Building access: The Shelby Center is open Monday through Friday from 6 a.m. to 6 p.m., with the central building staying open until 9 p.m. Monday through Thursday. Entrance to Shelby Center outside these hours and on weekends is available via swipe access with your Tiger Card. If your card does not have swipe access to Shelby already, you can request that it be added at `https://aub.ie/cardswipe`.

Textbook: No textbook is required for this course. The content provided in the lectures will be sufficient. However, if you wish to supplement your learning, I recommend selecting a good reference text from the examples listed below. Any of these texts will be a valuable resource for the course.

Reference Textbook(reference):

1. Artificial Intelligence: A Guide for Thinking Humans by Melanie Mitchell
2. AI: A Very Short Introduction" by Margaret A. Boden
3. Machine Learning for Everyone: How to Use Data and Algorithms to Drive Better Decisions by Michael Bowles

Course notes and supplementary material: Notes and other materials relating to each topic covered in the course are available through Canvas. You are expected to read the notes and interact with the other materials as we progress through the course. Although the course notes are relatively complete, they are not designed to be your only source of information on the course material. You are expected to use a textbook to supplement the course notes.

All access: `http://aub.ie/allaccess`

Grade Distribution:

Quizzes (Q)	10%
Assignment (A)	35%
Exams (E)	30%
Final project (FP)	15%
Inclass worksheets and Participation (P)	10%

Letter Grade Distribution:

>= 90.00	A
89.00 - 80.00	B
79.00 - 70.00	C
69.00 - 60.00	D
<= 59.99	F

Grade Calculation: Your total score(T) will be calculated as follows,
*T = (0.35 * A) + (0.10 * Q) + (0.30 * E)+(0.15 * FP) + (0.10 * P)*

Extra credit: Opportunities for extra credit are sometimes given to the entire class, but are never given on an individual basis.

Course Grading:

- **Quizzes:** The quizzes consist of five to seven short questions per lecture, to ensure that you are keeping up with the material. There will be one quiz per week.
- **Assignments:** Throughout the semester, there will assignments corresponding to one of the major topics covered in the course. These assignments are designed to reinforce your understanding of the key concepts and provide hands-on experience with the material.
- **Exam:** There will be two exams in this course. One midterm around week 7 and final exam which is comprehensive during the last week of classes. All exams are closed book, notes and web. All the exams will use lock down browser. Please make sure to install lockdown browser.
- **Final Project:** There will be a final project for this course. Students may choose a project topic from the list provided or propose their own topic for approval. The final project will consist of a written report, an in-class presentation, and participation in a QA session based on the presentations.

- **Late work policy:** The instructor may accept assignments turned in after the due date with a penalty (-10% per day). **No assignment will be accepted after one week of the due date or after the answers are published or shown in the lecture.**

Accounts:

- **OIT account:** This is the account associated with your TigerMail, and you have it by virtue of being an Auburn University student. This is also the account that will allow you to log in to Canvas, the course learning management system. You are expected to check the course in Canvas and your TigerMail frequently. Announcements and other information will be sent to you via Canvas. For assistance with your OIT account, please contact the OIT Help Desk (helpdesk@auburn.edu, 334-844- 4944, `http://www.auburn.edu/oit/helpdesk`).
- **Engineering Network Account:** You have an Engineering account because you are classified as an Engineering student and/or you are enrolled in an Engineering course. This account allows you to log in to any machine on the Engineering network, including those in the Engineering labs. The Engineering network provides all the components of a complete development environment that you would need for this course. For assistance with your Engineering account, please contact the Engineering Network Services Help Desk (admin@eng.auburn.edu, 334-844-2280, `http://eng.auburn.edu/admin/ens/helpdesk/`).

Tentative Course Outline:
The weekly coverage might change as it depends on the class's progress.

Week	**Topics**
Week 1	Course introduction, What is AI?, History and Evolution of AI
Week 2	Topics in AI (CV, NLP, Robotics, ML for biology)
Week 3	AI paradigms
Week 4	AI paradigms - Symbolic AI
Week 5	Data Visualization and Introduction to Machine Learning
Week 6	Machine Learning Continued, Core ML algorithms: Linear Regression and Logistic Regression
Week 7	Machine Learning Continued, Decision Trees, Clustering
Week 8	Introduction to Deep Learning
Week 9	Deep Learning Continued, CNN, RNN, LSTM
Week 10	Break
Week 11	Deep Learning continued, Transformers. Introducing LLMs
Week 12	LLM continued, Prompt Engineering, Techniques for creating effective prompts, How to use prompts effectively in AI systems
Week 13	How Generative AI works? Applications and benefits, Impact of Generative AI models
Week 14	Agentic AI, What is an Agent?, Architecture of AI, Types of Agent, What is an environment and its types?
Week 15	, AI Limitations, AI Ethics, Pitfalls, and Regulations
Week 16	Final Exam and review
Week 17	Finals Week

Table 1: Tentative Course Schedule

Course policies:

- **Time Commitment:** Auburn University has the following expectation of the time commitment and work that a course will require per credit hour. *"Auburn University expects that for each credit hour awarded, an appropriately prepared student will complete an average of 3-3.5 hours of academic work per week over the length of a 15 week semester."*[1]. You are expected to allocate an appropriate amount of time for this course.

- **Academic Honesty:** You will be held responsible for adherence to the Academic Honesty policies described in the Student Policy eHandbook1 . Each student is expected to apply the Auburn University Oath of Honor[2] to each graded item in this course: *"In accordance with those virtues of Honesty and Truthfulness set forth in the Auburn Creed, I, as a student and fellow member of the Auburn family, do hereby pledge that all work is my own, achieved through personal merit and without any unauthorized aid. In the promotion of integrity, and for the betterment of Auburn, I give honor to this, my oath and obligation."* What constitutes cheating on exams, tests, and quizzes is fairly obvious and everyone understands that anything other than individual work on these is wrong. Where many students are unsure of what is allowable and what is not allowable is in the completion of programming assignments. I encourage students to form study groups, help each other learn the course material, and help each other solve problems. Collaborative problem solving is a great way to learn. However, collaborative problem solving must be restricted to the level of concepts, strategies, and algorithms; it should **never** involve source code. If you're in doubt about a certain practice, it's best to ask rather than assume it's okay. In certain instances, course work is to be completed in groups rather than individually, but these instances will be clearly identified by the instructor and the collaboration is allowed only within the bounds set by the instructor.

- **Collaboration Policy:** Discussion of concepts, ideas, and techniques is allowed. After discussion, each student must write up their own solution. Copying another person's work, in part or whole, is not allowed. Giving another student your work, in part or whole, is considered cheating as well. If you are unsure whether your collaboration is acceptable, speak with the instructor in advance. The internet is a great place to find out how to do things in Java, and we encourage you to use it for that purpose. However, copying a whole program or assignment, or a large chunk of one and turning it in as your own work is cheating. Think about the purpose of an assignment; if what you are doing bypasses the purpose of the assignment, then it is probably cheating. Code copied from each other or found on the net will result in an automatic zero and – depending on the egregiousness of the offense – may result in earning an 'F!' for the course and facing academic disciplinary measures.

- **Attendance:** Attendance affects your grade as per the Course Grading section of this syllabus. You are expected to attend all class meetings and stay for the entire period. You are responsible for all material presented in class meetings whether you are present or not. It is your responsibility to collect any graded materials that were returned during your absence. If you are excessively late to an exam, the instructor reserves the right to count you absent from the exam and give you the opportunity to take a make-up.

- **Classroom Behavior:** The Auburn University Classroom Behavior Policy is strictly followed in this course. Please refer to the *Student Policy eHandbook* for details.

- **Make-Up Work:** Work missed during the semester will be assigned a grade of zero points. Make up work will be given only for valid University excuses with appropriate

[1] 1 `http://www.auburn.edu/student_info/student_policies/`

[2] 2`http://wp.auburn.edu/sga/initatives/academic-affairs/oath-of-honor/`

written verification (see the *Student Policy eHandbook*). It is always your responsibility to initiate arrangements to make up missed work, and these arrangements must be initiated within one week of the original missed due date or within one week of the end of the period of excused absence.

- **TigerMail and Electronic Communication:** You are responsible for checking your TigerMail email each day. You are required to set your Canvas Notification Preferences to email your TigerMail account right away for new announcements and for conversations to which you are added. Per the *Student Policy eHandbook*, email sent to your TigerMail account is considered official University communication and you are held responsible for it.

- **Accommodation Policy for Students with Disabilities:** Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by email. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

- **Grade Appeals:** With the exception of the final exam grade, you have one week from the posting of a grade or the return of a graded item, whichever is first, to dispute the grade. You will have a very short period of time to dispute the final exam grade before official letter grades are recorded with the University. Appeals for re-grading any graded item must be made via email to the instructor no later than one week after the item is returned to you. In the appeal, you must describe (a) exactly what portion you wish to be re-graded and (b) the reasons you are requesting the re-grading in a clear, concise manner.

- **Electronic Devices:** No electronic device, with the exception of a standard calculator, will be allowed during exams.

- **Data Collection and Use Disclosure:** Any and all results of assignments and exams are data sources for research and assessment, and may be used in publications related to research and accreditation. All such use will be anonymous.

- **Emergency Contingency:** If normal class and/or lab activities are disrupted due to illness, emergency, or crisis situation, the syllabus and other course plans and assignments may be modified to allow completion of the course. If this occurs, an addendum to this syllabus and/or course assignments will replace the original materials.