

CSC 202-01, Introduction to Machine Intelligence
Fall 2019
Eastern Connecticut State University

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Office Hours: MWF: 10-11:00
MW: 2-3:00, or by appointment

Course information:

Title: Introduction to Machine Intelligence
Day/Time: MWF 9:00 – 10:00 AM (SCI 135)
Section: 01
Credit: 3 hours

Course Materials:

1. Required interactive textbook: *Programming in Python 3 with zyLabs*, <http://zyBooks.com> zyBook code: **EASTERNCTCSC202DancikFall2019**
2. Course notes and class material: <https://gdancik.github.io/>
3. *Python* (<http://www.python.org>), *Jupyter Notebooks/Lab*, (<https://jupyter.org/>) and *Spyder* (<https://www.spyder-ide.org/>) will be used for programming assignments. Installation instructions can be found on the Course Information section of the website.
4. Piazza (<https://piazza.com>) will be used for online discussion and several assignments. Note: a mobile app is available from the App store (iPhone/iPad) or Google Play (Android devices)
5. Recommended Textbook: Deitel, Harvey and Deitel, Paul. *Introduction to Python for the Computer and Data Sciences : Learning to Program in a World of Big Data and AI*. Pearson Education, United States, 2019.

Course Description

Machine Intelligence is the sub-discipline of computer science concerned with the automation of tasks which have, traditionally, required human intelligence. The course provides an overview of the current state of the art, and provides instruction in the technologies and techniques required to utilize or develop new intelligence-based systems. Students will gain hands-on experience writing computer code using modern scripting languages such as Python and using cloud-based services to create sample intelligent applications that access and analyze information to solve problems. Since these technologies can greatly amplify the influence of any one person the societal impacts and ethical issues regarding the design and application of the technology will be discussed.

This course satisfies the Tier 2 IT Requirement

Students will explore the application of information technology in one or more areas such as information systems, networks, data analysis, model development, simulations, graphic design, artistic creation, the impact of computers on society or the ethical use of digital information. These courses will enable students to apply information technology in problem-solving, the pursuit of knowledge, and the communication of ideas. Students will recognize when information technology will assist or impede the achievement of a goal.

The student learning outcomes, corresponding course activities, and assessment methods are provided below.

| Tier II: Applied Information Technology | | |
|--|---|---------------------------|
| Student Learning Outcomes | Specific Course Activities | Assessment Methods |
| 1. Explain digital representation of information | Develop computer programs to process data, including numeric data, text, images, and real-time voice data. | Projects and Exams |
| 2. Compare information technologies in both abstract and concrete terms | Compare and contrast machine learning methods, for example for sentiment analysis and image classification. | Projects |
| 3. Employ specific information technology to manage existing information, solve problems, and communicate or create new ideas | Development of programs (such as an Interactive digital assistant) to automate problem-solving tasks | Projects and Exams |
| 4. Explain the technical and ethical limits of information technology | Ethical considerations of machine intelligence will be discussed, including bots and automation, machine intelligence and moral decisions, and biases in intelligent systems. | Written Assignment |
| | | |
| TIER II: Synthesis and Application (required for all Tier II courses) | | |
| 1. Identify and apply diverse methods of inquiry and ways of knowing in making and evaluating decisions in human affairs | Obtained by cumulative activities of multiple requirements of courses in Tier II | |
| 2. Develop the ability to think creatively, and come to value ingenuity and originality by engaging in multiple modes of problem solving | Obtained by cumulative activities of multiple requirements of courses in Tier II | |
| 3. Apply ethical principles to practical problems of life and work | Case study exploring training data biases in facial recognition tool. | Written Assignment |
| 4a. Effectively communicate ideas orally: | Students will give a formal oral presentation of their final project. | Select Projects |

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| 4b. Effectively communicate ideas visually: | Student presentations will have a visual component, such as graphs and screen shots of their program. | Select Projects |
| 4c. Effectively communicate ideas in writing: | The students will document their code using standard techniques. Students will also complete written assignments exploring ethical issues in machine intelligence. | Code Documentation and Written Assignments |
| 5. Ability to think critically | The construction of the projects will require the application of complex tools and programming methods. | All Projects |
| 6. Effectively seek and employ information to achieve academic goals | The projects will involve guided discovery of solutions to problems. Through projects, students apply Machine Intelligence to their academic area of interest. | Class Projects |

Grading

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|---------------------------------|-----|
| Programming/Written Assignments | 25% |
| Python Assessment | 25% |
| Project #1 | 25% |
| Project #2 | 25% |

Online discussion: We will use Piazza (<https://piazza.com>) as an online discussion and question and answer forum in this course. Shortly after the beginning of the semester, you will receive an e-mail with registration instructions sent to your Eastern e-mail address. Piazza allows for students to post and answer questions, anonymously if desired. The class benefits by seeing questions asked by other students (who often have the same questions as you) and by contributing answers. As the instructor, I will answer questions and can endorse correct student answers as well. For these reasons, all non-personal (e.g., not grade-related) questions should be posted to Piazza rather than e-mailed to me. Questions regarding homework assignments should be posted to Piazza. Questions regarding homework must be specific and may contain no more than *several* lines of code. Note that posts not meeting these criteria will be deleted and the poster penalized if warranted. Note that piazza will be required for several assignments.

Assignment Deadline Policy: Late work will not be accepted without a justified excuse. If you know in advance that you will not be able to complete an assignment on time, talk to me **before** the due date so that an extension can be granted, if appropriate.

Grading Scale

| | | |
|------------------|------------------|------------------------|
| 93-100: A | 90-92: A- | |
| 87-89: B+ | 83-86: B | 80-82: B- |
| 77-79: C+ | 73-76: C | 70-72: C- |
| 65-69: D+ | 60-64: D | 59 and below: F |

Academic Honesty

You are encouraged to discuss projects and exercises with one another unless specified otherwise. However, copying answers from another student (unless otherwise specified) is *cheating* and this will not be tolerated. A student found cheating will automatically receive a grade of "F" on the assignment and will be reported to the department head with further potential consequences. In addition, students are responsible for familiarizing themselves with the University's numerous policies and procedures contained in the University Catalog and Student Handbook. The Code of Conduct policies and the Policy on Academic Misconduct are of special significance, since cheating, plagiarism, and personal misconduct are strictly prohibited and carry severe penalties. Students should read and understand Eastern's Academic Misconduct Policy, which can be found in the student handbook.

www.easternct.edu/academicmisconduct

All violations will be handled under the procedures established in this policy.

Classroom civility

Cell phones are not appropriate in class and must be turned off or set to vibrate and stored off of the class desk. In general, follow the Golden Rule and treat others with respect and

Accommodations for Students with Disabilities

Eastern Connecticut State University is committed to following the requirements of the Americans with Disabilities Act (ADA) of 1990, the ADA Amendment Act of 2008, and Section 504 of the Rehabilitation Act of 1973, as amended in 1998. If you are a student with a disability (or think you might have a disability) and require accommodations or assistance evacuating a building in the case of an emergency, please contact the Office of AccessAbility Services (OAS) at 860-465-0189 to discuss your request further. Please note that accommodations are not retroactive and must be communicated through a Letter of Accommodation, which is drafted by the OAS.

***Tentative course schedule**

| Week | Week of | Topic | |
|------|----------|--|---|
| 1 | 8/26/19 | Overview of Machine Intelligence | |
| 2 | 9/2/19 | <i>Labor Day – No Class Monday</i> | |
| | | Introduction to Python (input/output, variables, and expressions) | |
| 3 | 9/9/19 | Python Programming Fundamentals (object types) | |
| 4 | 9/16/19 | Python Programming Fundamentals (branching and loops) | |
| 5 | 9/23/19 | Review / Python Assessment | |
| 6 | 9/30/19 | Natural Language Processing | |
| 7 | 10/7/19 | Mining Twitter Data | |
| 8 | 10/14/19 | Speech Recognition and Watson Assistant | |
| 9 | 10/21/19 | Project #1: NLP / Watson Assistant | |
| 10 | 10/28/19 | Introduction to Machine Learning (using k-nearest neighbors) | |
| 11 | 11/4/19 | Introduction to Neural Networks | |
| 12 | 11/11/19 | Convolutional Neural Networks | |
| 13 | 11/18/19 | Ethical Issues in Machine Intelligence | |
| 14 | 11/25/19 | Ethical Issues (con't) | <i>Thanksgiving – No Class Wednesday or Friday</i> |
| 15 | 12/2/19 | Project #2 (Machine Learning) | |
| | 12/13/19 | Final Exam Period (8:00 – 10:00AM) | |