

Kennesaw State University
MTRE 4400 – Directed Research – Mechatronics
Course Syllabus – Spring 2019

I. Identifying information

Student(s): xxxxxxxx

Course: MTRE 4400 Directed Research – Mechatronics, 1 credit

Instructor: Kevin McFall, PhD.

II. Course Description

This directed study will explore the process of applying transfer learning using deep neural networks. Covered topics will be deep learning, convolutional neural networks, and fine-tuning using existing trained networks.

III. Objective of the Course

The goal is to develop code using downloaded pre-trained deep learning models and fine-tuning them to solve another task.

IV. Detailed Schedule

Week 1: Familiarize with neural networks, including convolutional neural networks

Week 2: Understand backpropagation and training of neural networks

Week 3: Install pyTorch

Week 4: Create sample code to train fully connected neural networks

Week 5: Create sample code to train convolutional neural networks

Week 6: Explore how to download pre-trained models in pyTorch

Week 7: Download pre-trained models for LeNet and YOLO

Week 8: Perform inference using pre-trained LeNet and YOLO

Week 9: Modify output layers of pre-trained networks to solve different problems

Week 10: Apply transfer learning by updating all tunable parameters to solve new problems

Week 11: Explore how to lock some tunable parameters to remain unchanged during fine tuning

Week 12: Begin writing draft manuscript

Week 13: Complete draft manuscript and submit for comments from instructor

Week 14: Rework draft manuscript

Week 15: Prepare final manuscript for submission

The student is expected to work independently on this project, of course under direction of the instructor. Meeting with the instructor is expected at least once weekly, demonstrating completion of the week's task. A minimum total of 50 hours of time per credit hour is required on this project. The student is expected to follow all safety guidelines when interacting with equipment as directed by instructors and laboratory technicians.

V. Basis for Evaluation

The primary deliverable for this course is a working code to fine-tune pre-trained deep neural networks. The student will be evaluated on satisfactory operation of the code (40%), compilation of a logbook documenting the progress made and time spent (20%), and preparation of a manuscript describing the code and its operation appropriate for submission to a conference or journal such as the [Early Career Technical Conference](https://www.uab.edu/engineering/me/conferences)¹ (40%). Grades will be assigned for each component according to the following rubric:

- A (90-100): Exceptional deliverable quality and/or completion of extended topics
- B (80-89): Satisfactory completion of deliverables
- C (70-79): Incomplete completion of deliverables
- D (60-69): Partial completion of deliverables
- F (0-59): Little or no completion of deliverables

¹ <https://www.uab.edu/engineering/me/conferences>

Federal, BOR, & KSU Course Syllabus Policies

Information contained in the links below constitutes the Federal, BOR, and KSU course syllabus policies and procedures and may be referenced by faculty members in their course syllabi. These policies are updated on the Academic Affairs Website annually.

[Academic Affairs - Federal, BOR, & KSU Policies](#)

[Academic Affairs - KSU Student Resources for Syllabus](#)

Note to Faculty: The KSU faculty handbook requires the Academic Integrity Policy in the course syllabus.

Note to Faculty and Students: The Office of the Provost will work to keep the policies and links in this document as accurate as possible.

Academic Integrity Statement

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section 5c of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement. See also [KSU Student Code of Conduct](#).

Electronic Communication

The University provides all KSU students with an "official" email account with the address "students.kennesaw.edu" or "kennesaw.view.usg.edu" (in D2L). As a result of federal laws protecting educational information and other data, this is the sole email account you should use to communicate with your instructor or other University officials.

Acceptance of Syllabus

Instructor: Kevin McFall Kevin McFall 12/06/2018
Name Signature Date

Student: _____
Name Signature Date