

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

I. Identifying information

Student(s): xxxxxxxx and xxxxxx

Course: MTRE 4400 Directed Research – Mechatronics, 3 credits

Instructor: Kevin McFall, PhD.

II. Course Description

This directed study will explore using machine learning to improve the quality of output from some sensor. The process of identifying a problem, developing a machine learning model, collecting data, training the model, and evaluating performance will be covered in this course.

III. Objective of the Course

The goal is to develop a machine learning system that takes in data from a low quality sensor as input and outputs data equivalent to that from a higher quality sensor.

IV. Detailed Schedule

Week 1: Conduct literature review of similar existing technologies

Week 2: Continue literature review

Week 3: Select a sensor and develop experimental design process

Week 4: Collect data

Week 5: Experiment with various model architectures

Week 6: Collect additional data

Week 7: Train full scale model

Week 8: Continue training and experiment with hyperparameters

Week 9: Complete training and collect any necessary data to perform model testing

Week 10: Test performance of model in operation

Week 11: Collect and organize necessary data for manuscript draft

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 150 hours of time 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 machine learning model. The student will be evaluated on satisfactory operation of the model (40%), compilation of a logbook documenting the progress made and time spent (20%), and preparation of a manuscript describing the model 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.