

SYLLABUS
Intelligent Adaptive Systems 2
Spring 2018

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|-------------------|-----------------------------|---------------------|--------------------------------------------------------------|
| Time | Tuesdays 5-7p | Place | COB2 267 |
| Instructor | Professor Christopher Kello | E-mail | ckello@ucmerced.edu |
| Office | SSM 262B | Office hours | By appointment |

Course Description. This is a graduate methods course designed to follow Intelligent Adaptive Systems 1. The course is required for students in the NSF-funding National Research Training program on Intelligent Adaptive Systems. It is designed to train students in methods relevant to their IAS interdisciplinary group projects. Each year, the content will be updated to reflect the projects developed by the cohort of incoming students. This year, the course is being taken by the first two IAS cohorts, consisting of seven research groups with 2-4 students per group. Each group submitted a paper at the end of the IAS 1 course in Fall 2017 describing their project plan, with relevant background literature, theory, prior results, and planning analyses/simulations. Four method modules emerged from the research papers, which are the foci of this course. The modules are listed below, along with the associated software planned for use (and subject to change):

- *Agent-based models of foraging and predator/prey dynamics.* The agent-based modeling platform will either be NetLogo or Mesa.
- *Time series classification with recurrent neural networks.* The planned modeling platform is TensorFlow using the Python API.
- *Iterated learning models.* The planned code to use is the ILMpy Python module.
- *Natural language corpus analyses.* The planned software is the NLTK Python module.

The exercises will be based on Python as much as possible, to give students unified and concentrated training in one programming language.

Course Goals: The primary goal is for students to learn methods relevant to IAS research in general, and needed to carry out IAS research projects. An integral part of this goal is for students to advance their programming skills relevant to data analysis and computational modeling in IAS research. A secondary goal is for students to advance their presentation skills in the context of giving tutorials to peers and other students.

Learning Outcomes: By the end of the semester, students should be able to write code, run computational models, and analyze data for IAS research. The specific coding, modeling, analyzing will vary by semester, and the level of proficiency achieved will vary based on each student's background. However, all students should be noticeably better coders, modelers, and analyzers. Also, each student should be better prepared to design and present tutorials in IAS and related research methods.

Course Requirements: The course is structured as a weekly seminar, with the first half reserved for instruction and presentations, and the second half reserved for working on exercises and groups projects, with the professor available for assistance and individualized training. Grading will be based on 1) four exercises (or groups of exercises) associated with each of the four methods covered in class, and 2) two groups presentations, one during one of the method modules, and one at the end of the course. To pass the course with a B or S, every exercise and both presentations must be fully completed by the end of the semester. Students will earn A grades by demonstrating expertise and quality in their work.

Academic Integrity: Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. Students are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. However, cooperation should not involve one student possessing work done by someone else. If copying is brought to the attention of the instructor, both the student who copied work from another student and the student who gave material to be copied may not receive credit for the associated class meeting or professional development exercise. Penalty for violation of the Academic Honesty Policy may also be extended to include failure of the course and University disciplinary action.

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.