BEE 499/599 - Applied Computation

Class meetings: Tuesdays & Thursdays, 1000-1150, Withycombe 205
Course website: sites.google.com/a/oregonstate.edu/appliedcomputation-bee499-599/
No required texts, all software open source or available through OSU licensing
Instructor: Dr. Jason Kelley
E-mail: kelleyja@oregonstate.edu
Office hours: Tuesday-Thursday 1300-1700, or by appointment

Applied Computation is an project based Engineering Science course in which students learn programming methods useful for research and engineering practice. It is intended for students who have had at least some experience using high level languages (Matlab, Python, C++, etc.), and want to further expand their repertoire of applied problem solving methods. It isn’t a course in computer science or program theory. Course materials will demonstrate programming skills to solve engineering problems, especially those encountered in environmental science and ecological engineering. Topics and assignments are modular and open ended, allowing students to identify and pursue topics that are challenging and relevant to their degree program, skill level, and personal learning goals.

Meetings are held twice weekly for two hours in a computer classroom. Each session includes a ~50 minute demonstration/lecture and a ~50 minute work session, student presentations, discussion, etc. Reading material is provided each week for the following week’s topic. During sessions, students are expected to work on projects, collaborate, and/or seek help. Course content addresses three main topics:

1) general engineering practices, programming structure and problem solving methods;
2) building a library of methods for analysis, plotting, and computational efficiency;
3) analysis of time series, spatial data, statistics, and specific computation methods.

For each topic, student initiated projects will be completed. Undergraduates will select projects from a list of formatted problems, and will also complete structured assignments. Graduate students will develop projects that match their research interests, submit formal proposals for each project, develop code, and test the proposed methods. All students will propose, complete, and present an individual final project. Required peer review will be part of the grading process.

Active participation is expected for this course. While the content of the course is primarily on quantitative analysis and programming, learning outcomes are mainly focused on communication and problem solving skills. Each student will maintain a course logbook documenting their progress and project development. The log book, class attendance, and participation in work sessions will be considered in course grading. The instructor and students are expected to follow the BEE department’s standards of conduct.

ASSIGNMENTS & GRADING

Evaluation will include both peer and instructor review. Brief (~10 minutes) presentations during class meetings may be substituted for one formal project report. Reports will be reviewed in writing by one peer, and presentations will receive group reviews. Because students are free to choose any programming language, students are encouraged to work with a review partner using the same platform. Collaboration and review should not be confused with plagiarism - all assignments and projects must be completed independently. Appropriate methods to use, adapt, and cite the work of others will be discussed in the first class session.
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Undergraduates students will have structured assignments, and provided a list of potential projects to complete. Graduates are assigned one structured assignment during week 1, and will propose and complete projects for the remainder of the course. Graduates are also invited to give in-class presentations. Credit for grades is divided as follows:

- 20% Participation (logbook, peer reviews, attendance, in-class contributions)
- 20% Proposals (graduates) Structured assignments (undergraduates)
- 40% Three projects (Project content, formatting, summary, report or presentation)
- 20% Final Project (Project content, formatting, summary, report and presentation)

In lieu of “extra credit”, more points are available in each section of the graded work than are required, allowing students to prioritize assignments and deadlines.

DEADLINES: All assignments are due by the start of class on the posted dates. Late work is strongly discouraged - a 20% late penalty is applied for each day late.

Undergraduate engineering students may petition for course credit to be applied as an Engineering Elective - see the instructor and the BEE petition form.

COLLABORATION & COMMUNICATION

Instructor communication and assignment submissions will only be accepted during normal business hours (800-1800 M-F) unless prior arrangements are made. All assignments are submitted electronically as .pdf or .html, or as described below. Materials submitted for this course should be formatted as follows:

- Log book: bound notebook documenting time spent and method development. The logbook should be submitted as a physical document (at end of course).
- Proposals: should completely describe project objectives, deliverables, timeline, and references. Should not exceed 3 pages in length.
- Code/programs: all code will be submitted as supplementary material with project reports (or summaries). Code includes all sub-functions, libraries, .exe’s, etc. necessary to run the program, zipped into one compressed folder.
- Summaries: If results are presented in lieu of a written report, only a summary needs to be submitted. Follow executive summary or similar format (< 1 page)
- Reports: Formatting can either follow the BEE Assignment Guidelines, or can be structured as technical blog posts, such as found at StackExchange or MatlabCentral. Regardless of format, reports should include: abstract, problem statement, methods, results, discussion, and references.
- Presentations: Presentations can use any creative approach, but should include at minimum both spoken and visual components. Following the basic elements listed under reports, the presentation should not exceed the time limit.
- Peer review: Pre-formatted review forms will be provided to guide feedback. Report reviews will be directly shared with authors and instructor. Presentation reviews will be submitted to instructor, anonymized and returned to presenters.

STUDENTS WITH DISABILITIES: "Students with documented disabilities who may need accommodations, who have any emergency medical information the instructor should know, or who need special arrangements in the event of evacuation, should make an appointment with the instructor as early as possible, no later than the first week of the term. In order to arrange alternative testing, the student should make the request at least one week in advance of the test. Students seeking accommodations should be registered with the Office of Services for Students with Disabilities."