

Scientific Investigations Using Computation Syllabus

Spring 2021

Class time: Tuesday/Thursday 9:30 – 10:50 (on-line)

Lab time: Tuesday 2:30 – 5:30 (on-line)

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Office Hours:

Most Tuesdays: 1 pm – 2 pm

Most Wednesdays 10 am – 2 pm

(for other times, or to confirm, please send e-mail; see class website)

Instructor Website: <https://webs.wofford.edu/panoffrm/>

Course website: <https://webs.wofford.edu/panoffrm/COSC150/>

Required Text: *Various articles and Background reading as posted to class website.*

Course Description: With improved and nearly-ubiquitous computational abilities, especially given the explosion of the amount of data, all of us now routinely utilize computational tools and technologies to ask and answer *driving questions*, to formulate and test hypotheses, and to mediate our interaction with the real world. Thus, in addition to *theory* and *experiment*, *computation* has emerged as a third major paradigm of science and learning. While running and modifying computational models across the mathematical, physical, life and social sciences, we will explore important science concepts and implement scientific methods using computational tools to gain a better understanding of our world.

Learning Outcomes: In this course you can expect to experience the *power of observation, the excitement of exploration, and the joy of discovery* through studying models and simulations across the domains of mathematics and science. By the end of the course, you should advance in knowledge and skill in using a wide range of computer-based tools to:

- Understand scientific methods and their application through inquiry-based computational investigations in different sciences;
- Explore, experience, and express scientific modeling processes through multiple representations (*e.g.*, data, concept map, story, mathematical formulation);
- Demonstrate your ability to run, analyze, and extend *empirical, system, and agent models* through individual and collaborative work;
- Survey, analyze, and summarize literature on historical and current issues being addressed by scientists;
- Understand a range of models in your own primary field(s) of interest/study and *–by analogy and extension–* across the sciences;
- Demonstrate ability to perform simple *a priori* and *a posteriori* error analyses to address the fundamental question: **How do you know if it is right?**
- After reflection, you should be able to share your new knowledge through written and oral communications.

Computer Use in Class and Lab: Please use your laptop computer for every class and lab meeting. In specific cases, an iPad or many Android tablets will not be appropriate as they will not run the software environments we will use during the course. During the first lab meeting, we will work with you to load/test some of the necessary software we will use during the course.

Use of your computer, smartphone, or other device during class or lab time must be restricted to assigned course content and work and not for unauthorized web surfing, news checking, messaging or other social media or e-mail. Your focused attention is an essential component of your learning environment and for your contributions to class collaborative investigations and discussion.

Assessment: Your grade will be the grade that you earn by demonstrating the ability to interpret a variety of scientific models that you will run, modify and/or extend using a variety of computational tools. ***The work that will be assessed will be accomplished both in class, lab, and on your own time, including both individual and team assignments and projects.***

Besides class participation in discussion and presentations (25%) and lab explorations (25%), there will be written reflections and/or (almost) weekly in-class quizzes (30%). There will be a final project (model plus paper) that will require a formal written presentation and in-class oral presentation (20%).

Final grades will be based on the following scale:

A: 90-100% B: 80-89% C: 70-79% D: 60-69% F: 0-59%

Note: “+” and “-” grades will reflect my judgment of your degree of class participation and/or improvement in class/lab work over the semester.

Academic Integrity: (Adapted, mostly copied, from A. Shiflet’s 2014 Syllabus) The ***Wofford Honor Code*** requires students to maintain a high standard of individual honor and integrity. ***Work represented as your own must be your own.*** You may not copy graded work, or models, or tests in any way from another person or from the Internet. All submitted work is to be pledged by you.

For some assignments you will work as a part of a team. In that case, these principles apply to a team as though it were an individual student. If doing work in a team, every member of the team should participate completely. It is a breach of the honor code to present work including the name of someone who did not fully participate in the project or to have work presented with your name when you did not fully participate in the project. ***You can always get my help on an assignment.*** Each student is responsible for reading and following the "Wofford Honor Code" at:

[Wofford Honor Code](#)

Attendance: You are expected to attend every class and lab on-line (see above). Not all classes will be recorded. If you know in advance (athletic or academic trips) that you cannot fulfill this expectation on a specific occasion, please inform me *in advance*. If you become sick/contagious, please take care of yourself, then stay in bed and get better! notify me when you can. Otherwise unexcused absences may not be eligible to make up lost work.

Late Work: All assignments are due on or before the date/time announced. Unexcused late work will not be accepted.

Special Request: Please do not wear sunglasses, lacrosse helmets, other hats or caps, or have a hoodie pulled over your head. Present yourself in a professional manner.

Accommodation: please let me know if you need any services as described: [Wellness Center Accessibility Services](#)

Notes: