

Course Name

Analytical Workflows

Course Number

IB 516

Course Credits

4

Course Meeting Times

Lecture, Tuesday & Thursday 10:00-11:50 am

Prerequisite and/or Corequisite

Prerequisite: None

Course Catalog Description

Examines and implements the theory and implementation of efficient, reproducible workflows – including best practices in scientific programming, project management, and collaboration – for computational, analytical, and data-driven biological research.

Course Contents

- Week 1:** Course overview & Philosophy
Structuring projects & Version control with Git
- Week 2:** Project proposals
Workflow diagrams
- Week 3:** Coding best practices
Hack-a-thon & discussion
- Week 4:** Git w/ GitHub (*Project management & collaboration*)
Hack-a-thon & discussion
- Week 5:** Typesetting with Markdown
Data visualization
- Week 6:** Project progress presentations
Hack-a-thon & discussion
- Week 7:** Faster computing (*Vectorization & parallel computing*)
Hack-a-thon & discussion
- Week 8:** Faster computing (*High performance computing*)
Hack-a-thon & discussion
- Week 9:** Typesetting with L^AT_EX
Hack-a-thon & discussion
- Week 10:** Project presentations
Project presentations & Wrap-up

Course Specific Measurable Student Learning Outcomes

After successful completion of this course, students will be able to:

1. Translate a research plan into an explicit analytical workflow;
2. Apply best practices in scientific programming to construct reproducible research;
3. Manage and collaborate on complex research projects using a version control system;
4. Apply analytical workflows to advance their dissertation research.

Evaluation of Student Performance

Our primary goal in this course is for students to develop more efficient research skills. An important secondary goal is to have students make significant progress on their thesis work. Our philosophy is that students can achieve both because our primary goal is best achieved by having students practice new tools while working on their own research.

Student learning will be verified during weekly “hack-a-thon” sessions, by weekly assessment of their “pushes” of “commits” to their GitHub repositories, and by evaluation of three project presentations. (See rubrics at https://github.com/analyticalworkflows/TeachingMaterials/tree/master/course_info/rubrics).

- Hack-a-thon & Paper discussions - *200 points*
- GitHub commits - *200 points*
- GitHub README Markdown page - *50 points*
- L^AT_EX summary report - *50 points*
- Project proposal presentation - *200 points*
- Project progress presentation - *200 points*
- Project final report presentation - *300 points*
- Total - *1200 points*

| Grade | Percent Range | Grade | Percent Range |
|-------|---------------|-------|---------------|
| A | 94-100 | C | 73-75 |
| A- | 90-93 | C- | 70-72 |
| B+ | 86-89 | D+ | 66-69 |
| B | 83-85 | D | 63-65 |
| B- | 80-82 | D- | 60-62 |
| C+ | 76-79 | F | < 60 |

Learning Resources

All learning resources will be supplied at no cost. All used software will be free and open-source. For complete access to all teaching materials and learning resources, see <https://github.com/analyticalworkflows/TeachingMaterials>.

Course Policies

Academic Calendar

All students are subject to the registration and refund deadlines as stated in the Academic Calendar: <https://registrar.oregonstate.edu/osu-academic-calendar>

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Student Conduct Expectations

<https://beav.es/codeofconduct>

Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

Student Evaluation of Courses

During Fall, Winter, and Spring term, the online Student Evaluation of Teaching system opens to students the Wednesday of week 8 and closes the Sunday before Finals Week. Students will receive notification, instructions and the link through their ONID email. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to “sign” their comments, agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.