MTH 263: Computational and Applied Math Practicum (CAMP)

January Interterm 2027

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January 5–19, 2027 | 9:00 a.m.–4:30 p.m.
2 credits | Satisfactory/Unsatisfactory | In person
Location: Burton 209
Prerequisite: MTH 211 or PHY 210

Course overview

CAMP is an intensive introduction to computational and applied mathematics research. Over two weeks, students work together in a research-group setting, combining short lectures and guided activities with substantial independent and small-group work. The goal is not necessarily a finished research result. Instead, CAMP is a *meta-research* experience: students learn to identify tractable questions, build computational skills, document their work, communicate partial results, and change course thoughtfully when an approach does not work.

The first half of the course emphasizes assigned research tasks and shared computational skills. During the second half, students pursue more open-ended investigations individually or in small groups. MATLAB is the principal computational platform, with introductory use of Git/GitHub and other tools as appropriate.

Learning goals

By the end of CAMP, students should be better able to:

- Plan a research-style workday, assess progress, and articulate concrete next steps.
- Use MATLAB for basic calculations, modeling, data analysis, visualization, and simple computational experiments.
- Organize computational work using clear filenames, documentation, and introductory Git/GitHub practices.
- Identify gaps in understanding, seek appropriate resources, and ask focused questions.
- Apply mathematical methods such as regression, singular value decomposition, and introductory numerical methods as appropriate to a question.
- Write concise research memos and communicate work in progress in short presentations.
- Scope and pursue an open-ended question, recognizing uncertainty and methodological limitations.

Meeting dates and typical day

CAMP meets **Tuesday–Friday, January 5–8; Monday–Friday, January 11–15; and Tuesday, January 19, 2027**. There is **no meeting Monday, January 18** (Martin Luther King Jr. Day). These are ten full in-person instructional days.

9:00–9:30	Warm-up, questions, and work plan
9:30–11:00	Mini-lecture, guided computing, or discussion
11:00–12:00	Individual or small-group work
12:00–1:00	Lunch (not counted as academically engaged time)
1:00–2:00	Guided task, workshop, presentations, or consultations
2:00–4:00	Computational and project work
4:00–4:30	Documentation, discussion, daily reflection

Course structure and work

Part I: Structured research and skill-building (January 5–11). Students complete shared computational investigations in MATLAB, work with datasets and models, practice writing research memos, learn basic reproducible computing habits, and give a midpoint presentation. Example topics include plotting and exploratory data analysis, regression, PCA/SVD, differential equations, introductory machine learning, and Git/GitHub.

Part II: Open-ended projects (January 12–19). Students develop a feasible research question or project, discuss its scope with the instructor, and carry out computations, analysis, and documentation. Regular project check-ins and short progress discussions provide feedback. The course concludes with final presentations on January 19.

Required work includes daily participation and computational activities; daily planning and reflection; brief research memos and documentation; midpoint and final presentations; an open-ended project; and the independent final portfolio. Thoughtful attempts, sound documentation, and an ability to explain obstacles matter more than whether an experiment works as hoped.

Independent final research portfolio and reflection (5 clock hours)

Students will assemble and submit a concise portfolio *outside scheduled class meeting hours*. It should include:

1. **Computational record (approximately 2 hours):** select and organize representative code, figures, data descriptions, or other artifacts; provide enough annotations and filenames that another person can understand what was attempted.
2. **Reflection on skills and research process (approximately 1.5 hours):** discuss tools learned, at least one significant obstacle, how you responded, and what you would do differently.
3. **Future connections (approximately 1 hour):** describe how CAMP might inform a future course, research project, or internship; identify further skills or questions to pursue.
4. **Review and submission (approximately 0.5 hour):** check organization, clarity, and completeness.

This portfolio supplements rather than replaces the daily reflections and final presentation. Submit it by **Friday, January 22, 5 pm**. The assessment is based on engagement, completeness, and thoughtful explanation, not the production of a successful research result.

Assessment of learning and student feedback

We will use a small number of recurring questions to document how students' confidence and research practices develop. On **Day 1** and again on **Day 10**, students will briefly rate their confidence (for example, on a 1–5 scale) in: (i) using computational tools on an unfamiliar problem; (ii) deciding what to try when a research task is open-ended; and (iii) presenting unfinished work and explaining

what remains unclear. The end-of-course questionnaire will also ask for one concrete example of something learned and one suggestion for improving CAMP. These responses are intended as formative, self-reported evidence, not as a standardized test of technical proficiency.

Daily reflections, memos, projects, presentations, and final portfolios provide complementary evidence of student engagement and the research process. Course feedback may be summarized in aggregate for future program assessment; identifiable student work or direct quotations will be shared externally only with permission.

Satisfactory/Unsatisfactory evaluation

To earn an **S**, a student must attend and actively participate in scheduled activities (except for approved absences with an agreed plan to make up missed academically engaged work); make good-faith efforts on assigned computational tasks; submit the daily reflections and required research memos; participate in both midpoint and final presentations; make documented progress on a project; and submit a complete, thoughtful final portfolio. Students are not evaluated on obtaining a predetermined result or on the sophistication of their final project.

A student who substantially fails to participate or does not complete essential course components after communication and opportunities to address the problem may receive a **U**. Because of the compressed format, students should contact the instructor promptly regarding absences, missed work, or difficulties completing requirements. Any make-up arrangement must preserve the required academically engaged time.

Attendance and course environment

Students should arrive ready to begin at 9:00 a.m. and expect to work throughout the scheduled day. Much of CAMP depends on conversations, troubleshooting, collaboration, and feedback that cannot be fully reproduced by a conventional take-home assignment. Please notify the instructor promptly if illness or another serious circumstance prevents attendance. Research is often nonlinear: changing direction, encountering errors, and asking for help are normal parts of the course.

Computing and preparation

Students should arrange MATLAB access through Smith's MathWorks portal before the course if possible:
`https://www.mathworks.com/academia/tah-portal/smith-college-30276358.html`

Bring a laptop if available, a method for keeping track of notes and plans, and a willingness to try unfamiliar methods. Contact the instructor in advance if laptop access or installation presents a barrier. Introductory Git/GitHub practices will be included in course activities.