

Welcome To CS 446 —
Computational Modeling & Simulation II
(Interdisciplinary Science Research)
Colby College, Spring '26

Course: CS 446 — Computational Modeling & Simulation II (Interdisciplinary Science Research)
Class Meetings: T / R 11:00AM–12:15PM, meetings in Davis 117
Website URL: <https://cs.colby.edu/courses/S26/cs446>

Course Description

A research-oriented continuation of Computational Modeling and Simulation I. Students work in teams to complete a semester-long project in an interdisciplinary area, applying computational modeling and simulation techniques to address a research question. This involves all of the following: reading peer-reviewed articles; understanding the context of a research question in a research community; designing and implementing experiments and analyzing their results. Each team will produce a journal-style article and an oral presentation describing their project.

Prerequisites: Computer Science 346.

Your Professor: Eric Aaron

Website: <https://cs.colby.edu/eaaron>

Office: Davis 113

Office Hours: M 3:30–4:30pm; Tu 4:00–5:00pm;

W 2:30–3:30pm; and by email appointment

Please feel free to come by and chat—I look forward to talking with you!

Phone/Voicemail: 207-859-5857

E-mail: eaaron@colby.edu

NB: The above email address is the best way to contact me.

Course textbook

- None, but CS346 textbook *Introduction to Computational Science* by Angela B. Shiflet and George W. Shiflet may still be useful.

Grading: Your grades for the course will be computed based on

- Research Project (including manuscript and video presentation): 50% (There will not be a Final Exam for the course.)
- Class presentations and in-class “check-ins”: 20–25%
- Smaller assignments and Class Participation: 15–20%
- Final reflection assignment: 10–15%

The above percentages may be changed if administrative concerns demand it. Other assignments not explicitly included in categories above (e.g., steps toward CLAS participation, written assignments about research-related topics) may also be given (to be determined).

Desired Course Outcomes

- Students can use online databases to identify peer-reviewed literature relevant to their research topic. Students can identify a research community in which their research topic is relevant as well as published articles in that community that are most relevant to their research.
- Students can explain at least one research question, and explain and apply at least one associated computational model. Students can effectively apply at least one technique of simulation or analysis.
- Students can ask questions of interest to their research community about their system and its model. Students can write appropriate programs to produce and / or analyze results, using programming techniques and style to create validated, well documented code that is easy to extend and maintain.
- Students can perform their research within a team, and they can present and discuss their research in both oral and written forms.

The primary assignment for the course will be a semester-long research project. Because it is *actual research*, for which results cannot be known in advance, assessment of the research project will be based on constructive effort toward results and effective documentation of the work and process, rather than on the end results themselves.

In a typical class meeting, students will report on their current progress in their research project. Class meetings will also be time for making presentations to the group, for discussing topics of general relevance to the class, and for student research groups to work with me to help advance their research.

Class Meetings and Classroom Accountability

Discussion during class meetings is essential for the learning goals of this research-oriented course, and students are expected to be part of presenting progress on their research in class meetings. For this reason, class meeting attendance is exceptionally important; unexcused absences or excessive lack of attention during class meetings will result in a reduction of a student's Class Participation grade. Class Participation can take many forms, such as asking questions of peer presenters during class, discussing things with me in Office Hours that shape conversations during later class meetings, or other contributions that directly and constructively affect the conversations and interactions during class meetings. Students will not receive full credit for that part of the course grade without actively contributing to in-class discussions in some way. (If you have any questions about this as the semester goes along, please ask me!)

All students are responsible for **ALL** information given in class, whether or not it is presented in any other form (handout, course website, etc.). It is essential that students who miss a class meeting consult classmates and find out about any information—academic, administrative, or other—that they missed. There may be severe, unintended consequences for students who do not keep up with all information from class. It is your responsibility to see that this does not happen to you. The easiest way to ensure it: Attend every class meeting.

Use of Computers / Devices during Class Meetings: Scientific studies (e.g., Sana et al., 2013) demonstrate that the use of phones, computers, tablets, wearables, or other electronic devices during class meetings negatively affects the learning environment in the classroom—not just for the user of the device, but for classmates around them as well. This is exceptionally important to a discussion-oriented setting such as CS446. To improve our learning environment, the use of such devices is prohibited during class meetings unless explicitly permitted by your Prof. (and there may well be several times during the semester where devices are part of classroom work; TBD).

Homework Policies

It is exceptionally important in this research-oriented capstone course that assignments be completed on time. Many are due by the beginning of the class meeting in which they will be discussed, some are to enable me to look over your work before we discuss it in a class meeting, some are to make presentations in class meetings, etc., and lateness can substantially affect course meetings for *everyone* in the class. Please submit assignments on time!

For Smaller Assignments, grading will be on a $\checkmark + / \checkmark / \checkmark - / 0$ scale. If a Smaller Assignment is handed in up to 1 week late, there is a penalty of one “level” down; after that, there is a penalty of two “levels” down. The Research Project manuscript and video and the Final reflection assignment must be submitted on time; if late submissions are to be accepted, lateness penalties will be determined near the end of the semester, and they may be strictly enforced. And for any assignment, any lateness or lack of effort that negatively affects a class meeting will result in a deduction on the grade of that assignment.

These policies may be changed if administrative concerns demand it; if so, you will be given ample notice before the due date of any assignment affected by a Homework Policy change.

As with all CS446 policies, homework policies are intended to be fair to everyone involved in the course. They will be enforced fairly. Please feel free to ask me any questions about specific cases that may emerge over the semester!

Policy on Collaboration and Academic Integrity

Because CS446 is a research-oriented capstone course, the essential principles of the course collaboration / integrity policy are those of peer-reviewed research. Collaboration is welcome, and adopting and modifying ideas from outside sources is to be expected as part of your research! Your work (i.e., that of your research group), however, including all language / text / figures not explicitly quoted and cited in your manuscript and presentations, **must be entirely your own**. Give credit to others generously, whenever you think it might be appropriate: Do not use material (code, text, or figures) from any source without citing the source, claim research results you have not produced yourself, or knowingly make false statements. **As part of giving generous credit to others, on all assignments for CS446, please write down all sources of assistance, including everyone with whom you worked on the assignment.** Your “lab notebook” (see CS446’s first Smaller Assignment) is a great place to record sources or people consulted, as part of giving appropriate credit.

Colby’s “Avoiding Plagiarism” resource (<https://libguides.colby.edu/avoidingplagiarism>) lists examples of kinds of plagiarism. **Plagiarism is unacceptable in peer-reviewed research, and it is unacceptable in CS446.** This affects our standards regarding generative AI, some uses of which may constitute plagiarism; we will discuss this in class before arriving at a final CS446 policy regarding generative AI.

Documentation of students' research processes is essential for CS446 and part of the work on which grades are given. Inadequate documentation—which can include failing to authoritatively demonstrate that a group's work is their own as claimed and presented, not taken from uncredited or incompletely credited other sources (including, but not restricted to, generative AI)—will be negatively considered in assessing work and assigning grades; falsification of that documentation is considered plagiarism and could be a violation of Academic Integrity. Your professor reserves the right to ask students to verbally explain the reasoning behind any work that they submit and to modify assignment grades based on the answers; such explanations should be from primary foundations or first principles to receive full credit. (Merely observing that some other presentation did something so you did too, without demonstrating an understanding the foundations and reasons why, will not receive full credit.) It is vitally important that you turn in work that is your own! Please also see the **Statement on usage of generative AI**; in CS446, content created or significantly inspired by generative AI is not considered work that is your own.

Reports of academic dishonesty are handled by an academic review board. A finding of academic dishonesty may result in significant sanctions. From Colby's Academic Integrity Coordinator:

If a student is found responsible for academic dishonesty, the sanctions range from failing the assignment and receiving up to a one letter grade reduction in the course (typical for minor assignments) to failing the course (typical for a major assignment) for a first infraction. Subsequent infractions can lead to suspension and expulsion. Furthermore, regardless of the severity of the infraction, all students found responsible for dishonesty will have a disciplinary letter placed in their file for 6 years after they leave Colby. Disciplinary infractions are reported upon request to graduate programs, medical/dental/law schools, and employers. Thus, the consequences of even minor infractions can be significant.

For more details on Colby's Academic Integrity policies and procedures, see <https://www.colby.edu/academics/academic-integrity/>

In general, the highest level of academic integrity is expected of every student in this class. ***Research ethics and intellectual honesty are essential components of good science research.*** If there are any questions about collaboration or related policies that come up over the semester, please come talk with me!

Statement on usage of generative AI for CS446 The use of generative AI tools (including but not limited to: ChatGPT, Gemini, Llama, DeepSeek, CoPilot, etc.) is fraught in research and must be approached with care. **For CS446, using such tools is, in general, *strongly discouraged*.** We will have an in-class discussion before a final course policy on generative AI is determined.

Credit toward your CS446 grade in CS446, as in research, is based on work done by *you / your group*. Work done by generative AI is not done by your group; using generative AI can thus diminish the foundation upon which you can earn credit. That does not mean it is always a bad idea to use generative AI in research! It is, however, always a bad idea to plagiarize, and any undocumented / incompletely documented use of generative AI will be considered a violation of research ethics and may be reported as a violation of Academic Integrity. If you have questions about this policy, please ask me!

Statement regarding Academic Accommodations *The following is standard suggested language regarding Academic Accommodations at Colby. It applies to this course.*

I am committed to creating a course that is inclusive in its design. If you encounter barriers, please let me know immediately so we can determine if there is a design adjustment that can be made. I am happy to consider creative solutions as long as they do not compromise the intent of the assessment or learning activity.

If you are a student with a disability, or think you may have a disability, you are also welcome to initiate this conversation with the Dean of Students Office. The Dean of Students Office works with students with disabilities and faculty members to identify reasonable accommodations. Please visit their website for contact and other information:

<https://life.colby.edu/get-support/access-disability-services/>

If you have already been approved for academic accommodations, please connect within the two weeks of the start of the semester so the office can develop an implementation plan.

The Colby Affirmation

(<https://www.colby.edu/academics/academic-integrity/the-colby-affirmation/>)

Colby College is a community dedicated to learning and committed to the growth and well-being of all its members.

As a community devoted to intellectual growth, we value academic integrity. We agree to take ownership of our academic work, to submit only work that is our own, to fully acknowledge the research and ideas of others in our work, and to abide by the instructions and regulations governing academic work established by the faculty.

As a community built on respect for ourselves, each other, and our physical environment, we recognize the diversity of people who have gathered here and that genuine inclusivity requires active, honest, and compassionate engagement with one another. We agree to respect each other, to honor community expectations, and to comply with College policies.

As a member of this community, I pledge to hold myself and others accountable to these values.

Title IX Statement *The following is standard suggested language regarding Sexual Misconduct/Title IX at Colby. It applies to this course.*

Colby College prohibits and will not tolerate sexual misconduct or gender-based discrimination of any kind. Colby is legally obligated to investigate sexual misconduct (including, but not limited to, sexual assault and sexual harassment) and other specific forms of behavior that violate federal and state laws (Title IX and Title VII, and the Maine Human Rights Act). Such behavior also requires the College to fulfill certain obligations under two other federal laws, the Violence Against Women Act (VAWA) and the Jeanne Clery Disclosure of Campus Security Policy and Campus Statistics Act (Clery Act). To learn more about what constitutes sexual misconduct or to report an incident, see: www.colby.edu/studentlife/handbook-section/f-sexualmisconduct/.

I am committed to all Colby students feeling safe, accepted, and included in all aspects of their college experiences, including this course. Colby prohibits and will not tolerate sexual misconduct or gender based discrimination of any kind and is obligated, by federal and state laws, to respond to reports and provide resources to students. As your professor I am considered a “responsible employee” which requires me to report incidence of sexual assault, sexual harassment, dating violence, or stalking to the Title IX Coordinator.

If you wish to access confidential support services, you may contact:

1. The Counseling Center: 207-859-4490
2. The Title IX Confidential Advocate: 207-509-9122
3. The Office of Religious and Spiritual Life: 207-859-4272
4. Maine's 24/7 Sexual Assault Helpline: 1-800-871-7741

Mental and Emotional Health *The following is standard suggested language regarding Mental and Emotional Health at Colby. It applies to this course.*

I am invested in the mental and emotional health of my students. Even as I establish and maintain the academic standards of my course, I value each of you as individuals with complex lives, identities, and challenges.

Throughout the semester, the responsibilities of your Colby education may interact with situational as well as ongoing mental and emotional challenges in foreseeable and unforeseeable ways. If you are in need of reasonable flexibility due to an emotional situation or an ongoing mental health issue, please communicate as openly as possible with your Class Dean, and/or members of the office of Access and Disability Services, preferably in advance of the need, so that we can discuss how your circumstances interface with course requirements. Together, we will consider what is needed and what is possible. If we can discuss the situation, we can manage the situation together.

Please do not allow academic responsibilities to prevent you from getting help you need. Our Colby Counseling Services staff (207-859-4490) and the staff in the Dean of Studies office (207-859-4560) are available to connect with you. The safety of my students and every member of this community is paramount. If you or someone you know is struggling with thoughts of suicide or may be a danger to themselves or others, please call the on-call counselor immediately (207-859-4490, press "0").

Respect for Diversity *The following is standard suggested language regarding Respect for Diversity and Religious Holidays at Colby. It applies to this course.*

It is my intent that students from diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. I expect you to feel challenged and sometimes outside of your comfort zone in this course, but it is my intent to present materials and activities that are inclusive and respectful of all persons, no matter their gender, sexual orientation, disability, age, socioeconomic status, ethnicity, race, culture, perspective, and other background characteristics.

I have attempted to avoid scheduling exams during major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know within two weeks of the start of classes so that we can make other arrangements. Colby College is supportive of the religious practices of its students, faculty, and staff. The College is committed to ensuring that all students are able to observe their religious beliefs without academic penalty.

Class rosters are provided to each instructor with the student's legal name. I will gladly honor your request to address you by an alternate name and/or gender pronoun. Please advise me of this early in the semester so that I may make appropriate changes to my records.