

Applied Computing: Research and Industry Perspectives

COMS BC 3997: New Directions in Computing - Spring 2024



Semester: Spring 2024 | **Instructor:** Brian Plancher

Credit: 3 points (Seminar) | **Meeting time:** M 6:10pm-8:00pm | **Room:** Milstein 516

Prerequisites: COMS W3134 Data Structures (or equivalent)

**Enrollment Capped at 16 Students (Instructor-Managed Wait List)*

[You need to fill out this entry form to be considered for the course!](#)

And your mentor must fill out the [mentor form](#) which you will upload as a part of the entry form!

Description:

This course is designed as a **companion to mentored research and industry projects** in computer science that enable students to apply their learning in real-world contexts. While the course staff can provide general support for projects, they may not have the technical expertise to support all projects in depth. **Therefore, for Spring 2024, students are expected to have arranged for a mentored project during the course registration period and will need to present their project topic in the second class.** For example, a student could be working on a research project mentored by a professor or helping a local company develop a web interface to their product mentored by a company software engineer. **Mentors must commit to meeting with students at least every other week.** The course will be run through a mix of lecture and group work led by the course instructor as well as guest instructors from both industry and academia. Lectures cover a variety of applied computing topics designed to complement student projects and engage students with often underexplored considerations for effective and sustainable real-world projects. Students are evaluated both by their mentor on their project progress as well as by the course staff and peers on written deliverables and presentations.

Note: Per Barnard and Columbia policies, you cannot both receive payment and course credit, or credit in two courses, for a single project. However, expanded projects may be acceptable. Similarly, projects done in groups will need to have larger scope. If your project falls into any of these categories, please reach out to the course staff.

Learning Outcomes:

By the end of the semester, students will be able to:

- Develop long-term open-ended project management skills
- Write up a formal academic report in LaTeX
- Give formal project presentations
- Learn and practice a series of practical real-world skills to empower you in your future courses and careers (exact skills depend on the particular content of your project)

Grading:

- 40% Written Reports
- 20% Presentations
- 35% Mentor Evaluation
- 5% Attendance and Participation

Preliminary Course Schedule:

Week	Day	Date	Topic	Description	Deliverables	Readings	
0	M	Jan 22	Intro, Presentations and Technical Writing	Overview of the Course and Nuts and Bolts, Typical Structure of Papers and Presentations, Best Practices, Tips and Tricks		Tips for Presentations [1,2,3] Tips for Writing (CS) Papers [0.1,2,3]	
1	M	Jan 29	Background Research, Project Overview Presentations	Background Research Best Practices, Project Overview Presentations (2 minutes each)	Presentation: Project Overview	Requirements Engineering Tips for Reading (CS) Papers Barnard CS Research Guide	
2	M	Feb 5	Startup Engineering	Guest Lecture by Anne Solmssen and Matthew Dean of Ethena			
3	M	Feb 12	Performance Engineering	How do you make code fast?	Report: Background and Related Work	Memory Hierarchy Design and its Characteristics Research Infrastructures for Hardware Accelerators Ch 1	
4	M	Feb 19	Accessibility and UI Design	Guest Lecture by TBD			
5	M	Feb 26	Ethics	Guest Lecture by TBD	Report: Design / Algorithm / Proof / Implementation / Methodology		
6	M	Mar 4	Project Midterm Presentations (5 minutes each)		Presentation: Midterm Update		
7	M	Mar 11	Spring Break				
8	M	Mar 18	Privacy and Security	Buffer Overflows, Passwords, Internet Security, Privacy Guest Lecture by TBD			
9	M	Mar 25	Sustainability	Sustainable Computing from the Data Center to the Edge Guest Lecture by TBD			
10	M	Apr 1	IoT and Embedded Systems	Computational Hardware and Communication at the Edge: Constraints and Opportunities Guest Lecture by TBD	Report: Preliminary Evaluation / Results and Discussion		
11	M	Apr 8	Business	Guest Lecture by TBD			
12	M	Apr 15	TBD	Guest Lecture by TBD			
13	M	Apr 22	Final Project Presentations (10 minutes each)		Presentation: Final		
14	M	Apr 29			Report: Final Full Report		