# BIOE 589: Biomedical Image Computing Capstone Project

- **Semester**: Fall 2025
- **Credit hours**: 4
- **Time**: 3:30 PM - 4:50 PM TR (official time)
- **Location**: 3018 Campus Instructional Facility (official location)
- **Prerequisites**: BIOE 588, BIOE 484, BIOE 486, and BIOE 580
- **Co-requisites**: BIOE 489

***Actual meeting times and locations are determined with assigned mentors and may vary by project group.***

## Instructors


- Seonyeong Park, Ph.D. (sp33@illinois.edu)
- Yudu Li, Ph.D. (yuduli2@illinois.edu)
- Will Newman, Ph.D. (willn2@illinois.edu)

- Office Hours: Email Appointment

## Course Description

This course provides students with hands-on experience in applying machine learning and computational methods to real-world bioimaging problems. In each project, experimental bioimage data will be provided by industry or clinical partners, or obtained from open-source repositories. While projects are not required to be publishable or highly novel, they must demonstrate the systematic application, evaluation, and interpretation of machine learning and image computing techniques. By addressing authentic problems posed by sponsors, students will not only strengthen their technical skills but also gain practical experience that is valuable for future research and career opportunities.

## Course Objectives

By the end of this course, students will be able to:

- Identify and analyze real-world bioimaging problems.
- Explain state-of-the-art machine learning and computational techniques relevant to their project.
- Apply and implement appropriate techniques using open-source tools and libraries.

- Conduct statistical analyses by integrating knowledge from prior coursework.
- Demonstrate professional communication with industry and clinical mentors, as well as faculty mentors.
- Effectively present their investigations and implementations in both written reports and oral formats.

## Required Resources

- No textbook is required.
- **BIC Server Access**: Course projects will be performed using the Biomedical Image Computing (BIC) server. Instructions for remote access and usage will be provided at the beginning of the semester.
- **Computing Devices**: Students are expected to have access to a personal laptop or desktop computer capable of connecting to the BIC server.

## Grading & Assessment

***Grading and assessment methods may vary depending on the instructor. The following represents an example.***

The overall course grade will be based on the following components:

- 48% for weekly reports,
- 12% for biweekly meeting documentation,
- 20% for the final report, and
- 20% for the final presentation.

### Criteria

#### Weekly reports (48%)

A total of 12 to 13 weekly reports may be assigned, depending on the semester schedule. Each counts for 4%. If 13 reports are assigned, the final one will be treated as a 4% bonus. Reports must be submitted to both the faculty advisor and the industry mentor *by 11:59 PM CT the day before the weekly meeting*. They should follow a 1-2 page abstract-style format (~500-1000 words) and may include figures and tables summarizing key results. Figures and tables are intended to support clear communication and do not need to be highly polished. Simple and informative visuals are preferred over stylistic embellishment.

Each report will be evaluated based on the following, as applicable:

- Progress summary and comparison to the original plan
- Challenges encountered and proposed solutions (if any)

- Plan for the upcoming week
- Clarity, structure, and completeness of the report

**Biweekly meeting documentation (12%)**

A total of 6 to 7 biweekly meetings with the industry mentor may be held. For each meeting, students are expected to prepare a joint agenda in advance, based on discussion with the faculty advisor, and send it to all participants, including the faculty advisor, teaching assistant (if any), and industry mentor, *by 11:59 PM CT the day before the meeting*. After each meeting, a joint summary, including meeting notes and action items, should be sent to all participants *by 11:59 PM CT on the second business day following the meeting*. Each biweekly meeting documentation will be worth 2% total, consisting of 1% for submitting the agenda on time and 1% for submitting a complete and clear summary. If more than six meetings are held, any additional agenda or summary submissions will be treated as bonus credit.

**Final report (20%)**

- Problem statement and background
- Technical approach
- Results and analysis
- Clarity, organization, and adherence to formatting guidelines (MICCAI format)

**Final presentation (20%)**

- Logically structured and clearly described contents (problem, methods, and results)
- Effective use of visuals (tables, figures) and a well-structured professional delivery
- Time management
- Q&A responses

## Scale (%)

| Grade | Range | Grade | Range | Grade | Range |
|---|---|---|---|---|---|
| A+ | [97, 100] | C+ | [77, 80) | F | [0, 60) |
| A | [93, 97) | C | [73, 77) | | |
| A- | [90, 93) | C- | [70, 73) | | |
| B+ | [87, 90) | D+ | [67, 70) | | |
| B | [83, 87) | D | [63, 67) | | |

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|---|---|---|---|
| B- | [80, 83) | D- | [60, 63) |

## Statement of Accessibility & Accommodation

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail disability@illinois.edu or go to the DRES website. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnosis a previously undiagnosed disability by visiting the DRES website and selecting “Sign-Up for an Academic Screening” at the bottom of the page.

## Tentative Schedule

| Week | Event | Student Deliverable(s) |
|---|---|---|
| 1 | Weekly meeting #1 (faculty advisor) | **Before**: Weekly Report 1 |
| | Biweekly meeting #1 (industry mentor) | **Before**: Agenda<br>**After**: Summary (notes and action items) |
| 2 | Weekly meeting #2 (faculty advisor) | **Before**: Weekly Report 2 |
| 3 | Weekly meeting #3 (faculty advisor) | **Before**: Weekly Report 3 |
| | Biweekly meeting #2 (industry mentor) | **Before**: Agenda<br>**After**: Summary (notes and action items) |
| 4 | Weekly meeting #4 (faculty advisor) | **Before**: Weekly Report 4 |
| 5 | Weekly meeting #5 (faculty advisor) | **Before**: Weekly Report 5 |
| | Biweekly meeting #3 (industry mentor) | **Before**: Agenda<br>**After**: Summary (notes and action items) |
| 6 | Weekly meeting #6 (faculty advisor) | **Before**: Weekly Report 6 |

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|---|---|---|
| 7 | Weekly meeting #7 (faculty advisor) | **Before**: Weekly Report 7 |
| | Biweekly meeting #4 (industry mentor) | **Before**: Agenda<br>**After**: Summary (notes and action items) |
| 8 | Weekly meeting #8 (faculty advisor) | **Before**: Weekly Report 8 |
| 9 | Weekly meeting #9 (faculty advisor) | **Before**: Weekly Report 9 |
| | Biweekly meeting #5 (industry mentor) | **Before**: Agenda<br>**After**: Summary (notes and action items) |
| 10 | Weekly meeting #10 (faculty advisor) | **Before**: Weekly Report 10 |
| 11 | Weekly meeting #11 (faculty advisor) | **Before**: Weekly Report 11 |
| | Biweekly meeting #6 (industry mentor) | **Before**: Agenda<br>**After**: Summary (notes and action items) |
| 12 | Weekly meeting #12 (faculty advisor) | **Before**: Weekly Report 12 |
| 13 | Weekly meeting #13 (faculty advisor) | **Before**: Weekly Report 13 |
| | Last project meeting #7 (industry mentor) | **Before**: Agenda |
| 14 | Fall Break | — |
| 15 | Final draft due (report + presentation) | Full draft submission |
| 16 | Iterative revision | Revised final report/presentation based on feedback |
| 17 | Final presentation | Final version submission and presentation delivery |