GETTING STARTED: COMPUTER SCIENCE INDEPENDENT WORK
WELCOME!

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OUTLINE FOR THIS SESSION

- Outstanding IW Awards – Spring 2022
- Overview of independent work in Computer Science
- Details of important steps and deadlines
- Resources for more information and help
CONGRATULATIONS!

Samantha Chin
Associating Early Life Adversity with Functional Methylation Marks in an Ethnically Diverse Cohort
Adviser: Barbara Engelhardt

Phoebe Lin
Evaluating Object Classification Robustness on Disguised Subjects
Adviser: Olga Russakovsky

Zach Lopez
PerSothe: A Conversational AI Tasked with Positive Sentiment Change
Adviser: Danqi Chen

Indu Panigrahi
Improving Fine-Grain Segmentation via Interpretable Modifications: A Case Study in Fossil Segmentation
Adviser: Ruth Fong

Sara Schwartz
Improving Pronunciation Error Detection for English Language Learners
Adviser: Ilia Sucholutsky

Henry Tang
Analysis of the Effectiveness of Modern Pretraining Techniques in Cross-lingual Models
Adviser: Karthik Narasimhan

Kenar Vyas
Factorized Self-Attention for Autonomous Vehicle Behavior Prediction
Adviser: Jaime Fisac
LET’S GET STARTED!
What Is Independent Work?

Independent Work (IW):  
*An individual project to study an idea in depth.*

Examples:
- Algorithm
- System design
- Problem formulation
- Benchmark suite
- Proof of a theorem
- Application
- Investigate a dataset
- Etc…
Why Do Independent Work?

- Study a topic in depth
  - Dive into much more detail than is possible in a course
- Learn important skills
  - Technical writing, speaking, project management
- Work closely with faculty
  - Meet weekly, get advice, get to know them, etc.
- Do something interesting to talk about in…
  - Grad applications, job interviews, etc.
- Have fun!!
**Types of Independent Work**

- **Fall Term Project**
  - Some BSE juniors/seniors
  - Designed for one term, but can be followed by a related project in a later term
  - IW seminar, or one-on-one/individual advising

- **Two-Term/Thesis**
  - All AB seniors and some BSE juniors/seniors
  - Designed for a full year
  - One-on-one/individual advising
IW Seminars

- Same as one-on-one projects, but students work on related topics and meet with an advisor together.
  - Enables collaborative projects
  - Enables sharing of infrastructure
  - Enables feedback to/from other students

- Targeted at first-time IW students
  - Provides more help on how to choose good projects, how to manage time, how to design talks, how to write papers, etc.
Important Steps and Deadlines: Fall 2022 Projects

- September TBD: SEAS Funding Application due
- September 28: Written Project Proposal due, 11:59pm
- October 26: Checkpoint Form due, 11:59pm
- November 14: Attend How to Give an IW Talk
- December 6: Attend How to Write an IW Paper
- December 11: Oral Presentation Slides & Link to Video due, 11:59pm
- January 12: Written Final Report due, 11:59pm

https://www.cs.princeton.edu/ugrad/independent-work/important-steps-and-deadlines
Important Steps and Deadlines: Two-Term/Thesis Projects, Fall 2022

- September TBD: SEAS Funding Application due
- September 28: Written Project Proposal due, 11:59pm
- October 26: Checkpoint Form due, 11:59pm
- November 14: Attend How to Give an IW Talk
- December 6: Attend How to Write an IW Paper
- December 9: Progress Report due, 11:59pm

https://www.cs.princeton.edu/ugrad/independent-work/important-steps-and-deadlines
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>February TBD</td>
<td>SEAS Funding Application due</td>
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<tr>
<td>February 22</td>
<td>Written Draft Paper due, 11:59pm</td>
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<tr>
<td>March 1</td>
<td>Thesis Second Reader due, 11:59pm</td>
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<tr>
<td>March TBD</td>
<td>Attend How to Give an IW Talk (usually late March)</td>
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<tr>
<td>April 19</td>
<td>Thesis Written Final Report due, 11:59pm</td>
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<tr>
<td>April 23</td>
<td>Oral Presentation Slides due, 11:59pm</td>
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<td>April 24-28</td>
<td>Oral Presentation Week (schedule a time with your adviser to give a live oral presentation)</td>
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<tr>
<td>May 1</td>
<td>Two-Term Junior IW Written Final Report Due, 11:59pm</td>
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QUESTIONS
SO FAR?
Onto the specifics...
Submit a written description of your project plan

Logistics:
- Due September 28, 11:59pm Eastern
- 1-2 page paper
- Submit PDF document via IW portal
Written Project Proposal (Continued)

- Motivation and goal
  - “The goal of my project is…”
- Related work
  - Survey of prior work with similar goals
- Approach
  - Key novel idea
- Implementation plan
  - Things you plan to implement
- Evaluation Plan
  - Experiment design, data, metrics, comparisons
Write a short summary of what is done in the first half, and what is planned for the second half

Logistics:
- Due October 26, 11:59pm EDT
- Write two paragraphs
- Submit via IW portal
- Get feedback from advisor
Checkpoint Form

Please refer to independent work website for more information about this form.

Name *

Advisor *
  Funkhouser, Thomas

Project title *

Approximate number of meetings with your advisor *

Progress report *

Progress to date:

Current difficulties:

Next steps:
Give a nine-minute talk about what you’ve done over the whole semester

- Required for all seminar students, and any first-time BSE students.

Logistics:

- Attend “How to Give an IW Talk” on November 14
- Submit slides and video link via IW portal by December 11 at 11:59pm
  - Note: You must submit your FULL slide deck by the deadline above
Video-recorded oral presentations
  ▶ Record your oral presentation via Zoom, or
  ▶ Select another way to record your oral presentation

Save your recording either on Zoom or in Google Drive
  ▶ Submit a link to your recording to the IW portal

Submit a pdf of your slides to the IW portal

Seminar students: your instructor may ask you to practice or present in your group meeting, as well

One-on-one students: your adviser may ask you to present to their research group, as well
Oral Presentation (Continued)

- **Motivation and goal**
  - “The goal of my project is…”

- **Related work**
  - Survey of prior work with similar goals

- **Approach**
  - Key novel idea

- **Implementation plan**
  - Things you implemented. How did you do it? What remains to be done?

- **Evaluation**
  - Experiment design, data, metrics, comparisons, qualitative results, quantitative results, further results needed

- **Discussion**
  - Conclusions, limitations, future work
Submit a written description of your project, including results and conclusions

**Fall Term IW**
- Due January 12 by 11:59pm
- Attend “How to Write an IW Paper” on December 6
- Submit PDF via IW portal
- 20-25 pages, double-spaced, plus appendix

**Senior Thesis**
- Due April 19 by 11:59pm
- Attend “How to Write an IW Paper” on December 6
- Submit PDF via IW portal
- 40-50 pages, double-spaced, plus appendix

**Two-Term Junior IW**
- Due May 1 by 11:59pm
- Attend “How to Write an IW Paper” on December 6
- Submit PDF via IW portal
- 40-50 pages, double-spaced, plus appendix
Motivation and goal
  “The goal of my project is…”

Related work
  Survey of prior work with similar goals

Approach
  Key novel idea

Implementation
  Things you built. How did you do it? What remains to be done?

Evaluation
  Experiment design, data, metrics, comparisons, qualitative results, quantitative results, further results needed

Discussion
  Conclusions, limitations, future work
Additional Requirements for Two-Term/Thesis Students
Submit a draft for at least the first few sections of your written report

Logistics:
- Due February 23 by 11:59pm
- At least 4-5 pages, single spaced
- Submit PDF via IW portal
Select a member of the Princeton faculty to be a second reader on your project

- Second readers review your project and provide input on your grade

Logistics:

- Due in IW portal on March 1 by 11:59pm
  - Start asking early!
Second Reader Form

Please refer to independent work website for more information about this form.

Name *

Advisor *

Project title *

Who will be your second reader?
Note that your second reader will receive an email letting them know you selected them.

☐ My second reader is not listed above

☐ I confirm that my second reader has agreed to be a second reader for my thesis (you must get confirmation before submitting this form)

Submit

https://iw.cs.princeton.edu/portal
Give a live 12-minute talk about what you’ve achieved over the course of the year

- Required for all two-term and thesis students and all first-time BSE students.

Logistics:

- Slides due in IW portal on April 23, 11:59pm
  - Oral Presentations Week, April 24-28
  - Set up a time to present live (in-person or via Zoom) to your adviser.
More Logistics:

- Counts as Senior Departmental Exam for AB Seniors
- Attend “How to Give an IW Talk” on November 14 or in the Spring (late March)
- Utilize campus resources such as McGraw Center and Princeton Writes
Spring Oral Presentation, Continued
(Two-Term/Thesis Students, Only)

- **Motivation and goal**
  - “The goal of my project is…”

- **Related work**
  - Survey of prior work with similar goals

- **Approach**
  - Key novel idea

- **Implementation plan**
  - Things you implemented. How you did it? What remains to be done?

- **Evaluation**
  - Experiment design, data, metrics, comparisons, qualitative results, quantitative results, further results needed

- **Discussion**
  - Conclusions, limitations, future work
Additional Important Information
Manage your independent work

Spring 2022

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<tr>
<th>Project Title</th>
<th>Advisor</th>
<th>Due Date</th>
<th>Submission Link</th>
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<td>Written Proposal</td>
<td>Russakovski, Olga</td>
<td>2/17/2022 11:59 pm</td>
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<td>Oral Presentation Slides</td>
<td></td>
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</table>
Funding

Project-related expenses:
- Unusual hardware, software, data sets, etc.

Available funds:
- School of Engineering and Applied Science
  - Requires an adviser signature, don’t procrastinate!
  - Support up to ~$500 ($300 max for cloud computing services)
  - Open to ANY computer science student
- Student Activities Funding Engine (SAFE)
  - [http://www.princeton.edu/studentfunding](http://www.princeton.edu/studentfunding)
Collaboration

**INDEPENDENT** Work

- Every student must do their own project

Collaboration

- Multiple IW projects can be synergistically part of a larger effort, either with other IW students, or grad students
- Each student must carve out a distinct part with a clear goal, novel idea, evaluation methodology, etc.
- Each student must submit their own work
- Each student will be graded separately
Grading

- IW must be taken for a grade
- Grades are recommended by instructor, confirmed by IW Coordinators

Grades will depend upon:

- **Student initiative and contribution**: the creativity and originality of student ideas and/or degree of technical challenge undertaken
- **Student progress**: content, amount of work accomplished to date, clarity and polish of presentations
- **Student presentation and paper**: content, eloquence, organization and clarity
Grading (Continued)

- Majority of grade will depend upon quality of work
  - But, poor presentation and/or missing checkpoints will also have an impact

- Final papers submitted after 11:59pm on the due date will be assigned a 1/3 grade deduction.
Grading (Continued)

A-level
- Clear contribution – interesting, creative
- Solid execution and results – refined and tested
- Excellent talks, papers – thoughtful, thorough
- Student has taken initiative and led project

B-level
- Not-so-innovative – possibly obvious from previous work
- Working execution and results – not fully refined and tested
- Complete papers and talks – limited insights
Grading (Continued)

- **C-level**
  - Not innovative
  - Unfinished or not working implementation
  - Report looks like workbook or lab report

- **D-level**
  - Nothing interesting attempted, nothing gained
  - Report is stream of consciousness
Common Mistakes

- Mistake: Delaying project planning until last minute
  - Instead: Get started right away

- Mistake: Postponing meetings with your advisor
  - Instead: Try to meet once a week, even if it’s a brief meeting

- Mistake: Allowing yourself to get stuck
  - Instead: Talk to your advisor; don’t avoid them when you are stuck
  - TA’s are assigned to every seminar. Use them!
Mistake: Putting off work until the end of the semester
▶ Instead: Work consistently during the semester (10 hours per week, minimum)

Mistake: Preparing papers and presentations at the last minute
▶ Instead: Iteratively refine. Get feedback from your advisor.
If You’re Having Trouble…

Examples:
- If you expect to miss a deadline
- If you have problems with your advisor
- If you have problems with your project
- Other factors in your life (e.g. illness, death in the family, etc.)

If you tell us early, we might be able to help you
- We can direct you to the right person

Fixing problems post facto may be much harder
- Often involves Deans, etc.

LET US KNOW!
Who/What You Can Ask

- **Your Advisor:**
  - Anything research related
  - Not: “Can I skip the project proposal or final paper?”

- **IW Coordinators (Dr. Fish, Dr. Jamieson):**
  - Anything about mandatory requirements
  - Not: “Is this research interesting?”

- **IW Administrator (Mikki Hornstein):**
  - Anything about dates, forms, funding, etc.
  - Not: “Can you give me an extension?”
How to Ask Questions

Canvas/Ed – Primary Resource

- [https://princeton.instructure.com/courses/9148](https://princeton.instructure.com/courses/9148)
- Ask IW staff and other students questions about logistics, advice, toolkits, data sets, etc.

Email Mikki

- [mhornstein@princeton.edu](mailto:mhornstein@princeton.edu)
Where to Find More Information

- IW Website:
  - Important Steps and Deadlines
  - Guidelines and Useful Information

- Note: These slides will also be available on the website and Canvas
That pretty much covers it.

Let’s summarize the key points…
Immediate Next Steps

- Look over the IW website, and be aware of important upcoming deadlines
  - Important Steps and Deadlines
  - Guidelines and Useful Information
- One-on-one students: Schedule weekly meetings with your advisor
What to Do in September?

- Work diligently to develop your project plan
  - Work hard to define a specific goal
  - Understand all related work
  - Articulate what makes your project novel
  - Know what software and data you will use
  - Have a good idea of what you need to implement
  - Have a specific plan to evaluate your results

- Write your project proposal early, get feedback, and refine multiple times.
But the Term Just Started!

The first few weeks are really important…

- A good project plan is key to success
- It takes time to understand related work, relevant software, and available data sets
- It take iteration and refinement (multiple meetings with your advisor) to define a good project goal and novel approach
- Working hard in the first few weeks greatly reduces the chances of ending up with a weak project
My Thoughts on IW at Princeton

- This is your chance to do an in-depth project on a novel topic of your own choosing
  - It doesn’t get better than this
  - It’s probably why you came to Princeton
  - It’s certainly what you’ll remember most from your academic career at Princeton

- Take the initiative and BE AWESOME!
THANKS!

Any questions?