GETTING STARTED: COMPUTER SCIENCE INDEPENDENT WORK
WELCOME!

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OUTLINE FOR THIS SESSION

- Overview of independent work in Computer Science
- Details of important steps and deadlines
- Resources for more information and help
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

**One-Term Project**
- All AB juniors and 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: Spring OneTerm Projects

- **February 12:** SEAS Funding Application due, 11:59pm EST
- **February 23:** Written Project Proposal due, 11:59pm
- **March 18:** Checkpoint Form due, 11:59pm EST
- **March 23:** Attend How to Give an IW Talk, time 5:00pm EST, via Zoom
- **April 6:** Attend How to Write an IW Paper, time 5:00pm EST, via Zoom
- **April 18:** Oral Presentation Slides & Link to Video due, 11:59pm EST
- **May 3:** Written Final Report due, 11:59pm EST

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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>February 12:</td>
<td>Spring SEAS Funding Application due, 11:59pm EST</td>
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<tr>
<td>February 22:</td>
<td>Draft Written Paper due, 11:59pm EST</td>
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<td>March 1:</td>
<td>Second Reader due, 11:59pm EST</td>
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<td>March 23:</td>
<td>Attend How to Give an IW Talk, 5:00pm EST via zoom</td>
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<td>April 5:</td>
<td>Oral Presentation Slides due, 11:59pm EST</td>
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<td>April 59:</td>
<td>Oral Presentations Week</td>
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<td>April 15:</td>
<td>Final Written Paper due, 11:59pm EST</td>
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QUESTIONS SO FAR?
Onto the specifics…
Submit a written description of your project plan.

Logistics:
- Due February 23, 11:59pm EDT
- 1-2 page paper
- Submit PDF document via IW portal
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 March 18, 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: 

Submit
Oral Presentation (On-Term Students, Only)

- Give a nine-minute talk about what you’ve done over the whole semester
  - Required for all seminar students, and any first BSE students.
- Logistics:
  - Attend “How to Give an IW Talk” on March 23 at 5:00 pm EST via zoom
  - Submit slides and video link via IW portal by April 18 at 11:59pm EST.
    - Note: You must submit your FULL slide deck by the deadline above.
NEW for this term: recorded oral presentations

- Record your oral presentation via Zoom, or
- Record audio over your PowerPoint slides, 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 (On-Term Students, Only), 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
### Written Final Report (All IW Students)

- Submit a written description of your project, including results and conclusions

<table>
<thead>
<tr>
<th>OneTerm Projects</th>
<th>TwoTerm/Thesis Projects</th>
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<tbody>
<tr>
<td>Due May 3 by 11:59pm EST</td>
<td>Due April 15 by 11:59pm EST</td>
</tr>
<tr>
<td>Attend “How to Write an IW Paper” on April 6 at 5:00 pm EST via zoom</td>
<td>Attend “How to Write an IW Paper” on December 1, 2020</td>
</tr>
<tr>
<td>Submit PDF via IW portal</td>
<td>Submit PDF via IW portal</td>
</tr>
<tr>
<td>20-25 pages, double-spaced, plus appendix</td>
<td>40-50 pages, double-spaced, plus appendix</td>
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Written Final Report (Continued)

- 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
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 EST
- 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
Submit a draft for at least the first few sections of your written report

Logistics:
- Due February 22 by 11:59pm EST
- At least 45 pages, single spaced
- Submit PDF via IW portal
Spring Oral Presentation (Two-Term/Thesis Students, Only)

- Give a 12-minute talk about what you’ve achieved over the course of the year

Logistics:

- Slides due in IW portal on April 5, 11:59pm EST
- Oral Presentations Week, April 5: How thesis presentations will be given is still under discussion.
- Two-term IW presentations will be recorded by the student and the link provided
More Logistics:

- Counts as Senior Departmental Exam for AB Seniors
- Attend “How to Give an IW Talk” on March 23 at 5:00pm EST
- Utilize campus resources such as McGraw Center and Princeton Writes
- No in-person presentations this term.
- Virtual and remote: watch videos of others, provide feedback
Spring InPerson Oral Presentation (Two Term/Thesis Students, Only), 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 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
https://iw.cs.princeton.edu/portal
Funding

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

Available funds:
- School of Engineering and Applied Science
  - Application has been emailed to you by SEAS already!
  - 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)
**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
IW must be taken for a grade this semester, no P/D/F

Grades will depend upon:

- Student initiative and contribution: the creativity and originality of student ideas
- Student progress: content, amount of work accomplished to date, clarity and polish of presentations
- Student presentation and paper: content, eloquence, organization and clarity

Majority of grade will depend upon quality of work
- But, poor presentation and/or missing checkpoints will also have an impact
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, talks, and posters – 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!
Common Mistakes (continued)

⚠️ 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.
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. Gupta)
- 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?”
Canvas/Ed – Primary Resource

- https://princeton.instructure.com/courses/3513

- Ask IW staff and other students questions about logistics, advice, toolkits, data sets, etc.

- We will send announcement when student data upload is complete.
Where to Find More Information

 IW Website:

➢ http://www.cs.princeton.edu/ugrad/independent work
➢ 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 February?

- 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 takes 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 a deep 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?