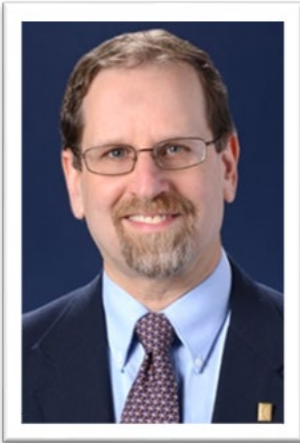


# GETTING STARTED: COMPUTER SCIENCE INDEPENDENT WORK

SPRING 2022

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# 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 2022 Projects

- February 11: SEAS Funding Application due, 11:59pm EST
- February 17: Written Project Proposal due, 11:59pm
- March 5: Checkpoint Form due, 11:59pm EST
- March 22: Attend How to Give an IW Talk, time 4:30pm EST, via Zoom
- April 5: Attend How to Write an IW Paper, time 4:30pm EST, via Zoom
- April 13: Oral Presentation Slides & Link to Video due, 11:59pm EST
- April 20: Written Final Report due, 11:59pm EST

<https://www.cs.princeton.edu/ugrad/independent-work/important-steps-and-deadlines>

# QUESTIONS SO FAR?



**Onto the  
specifics...**



# Written Project Proposals

- Submit a written description of your project plan
- Logistics:
  - ▷ Due February 17, 11:59pm Eastern
  - ▷ 1-2 page paper
  - ▷ Submit PDF document via IW portal



# Written Project Proposal

- 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



## Checkpoint Form

- Write a short summary of what is done in the first half, and what is planned for the second half
- Logistics:
  - ▶ Due March 5, 11:59pm EDT
  - ▶ Write two paragraphs
  - ▶ Submit via IW portal
  - ▶ Get feedback from advisor

Checkpoint Form - Comp. X

https://iw.cs.princeton.edu/portal/student/submissions/229/checkpoint

## Checkpoint Form

Please refer to [independent work website](#) for more information about this form.

**Name \***

**Advisor \***

**Project title \***

**Approximate number of meetings with your advisor \***

**Progress report \***

Progress to date: ← **Progress to date:**

Current difficulties: ← **Current difficulties:**

Next steps: ← **Next steps:**

Submit



# Oral Presentation

- 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 March 22 at 4:30pm
  - ▷ Submit slides and video link via IW portal by April 13 at 11:59pm
    - ▷ Note: You must submit your FULL slide deck by the deadline above



## Oral Presentation (Continued...)

- Video-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 (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

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

## Logistics

- Due April 20 by 11:59pm
- Attend “How to Write an IW Paper” on April 5 at 4:30pm
- Submit PDF via IW portal
- 20-25 pages, double-spaced, plus appendix



# 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 Important Information

<https://iw.cs.princeton.edu/portal>

## Manage your independent work

Spring 2022

**Project Title**

**Advisor** Russakovsky, Olga

**Written Proposal** → [Submit File](#)  
Due: 2/17/2022 11:59 pm



**Checkpoint Form** → [Click to complete form](#)

**Oral Presentation Slides** → [Submit File](#)  
Due: 4/13/2022 11:59 pm

**Oral Presentation Video Link** → [Click to complete form](#)  
Due: 4/13/2022 11:59 pm

**Written Final Report** → [Submit File](#)  
Due: 4/20/2022 11:59 pm



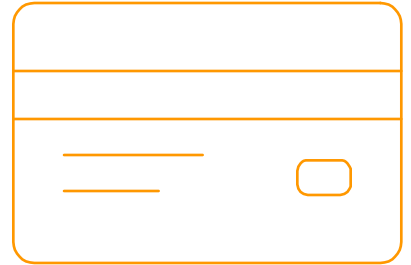
# Funding

## ■ 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>





# 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 this semester, no P/D/F
- 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
- 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 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!



## 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.



LET US  
KNOW!

A large orange speech bubble with a tail pointing towards the bottom left, containing the text "LET US KNOW!" in a bold, dark blue, sans-serif font.



# 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/7111>
- ▶ 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:

- ▶ <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 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?**