WELCOME!

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OUTLINE FOR THIS SESSION

- Best Poster Awards – Spring 2019
- Overview of independent work in Computer Science
- Details of important steps and deadlines
- Resources for more information and help
<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
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<tbody>
<tr>
<td>Charmaine Chan</td>
<td><strong>Laundrobot: A Laundry Folding Robot</strong></td>
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<tr>
<td>Handa Chun</td>
<td><strong>Adventure Through Princeton: A Familiar Approach to COS 126 Using Gamification</strong></td>
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<tr>
<td>Rohan Dhoopar</td>
<td><strong>Math Word Problem Solving Using Deep Learning</strong></td>
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<td>Jingwen Guo</td>
<td><strong>Teaching Reinforcement Learning Using an Interactive Module for Q-learning</strong></td>
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<td>Michael Man</td>
<td><strong>Chainwatch: Detecting 51% Attacks on Proof-of-Work Blockchains</strong></td>
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<tr>
<td>June Ho Park</td>
<td><strong>Predicting Film Locations in New York City Using Supervised Machine Learning</strong></td>
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<tr>
<td>Max Piasevoli</td>
<td><strong>Analyzing Political Bias in the YouTube Recommendation Algorithm</strong></td>
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<tr>
<td>Spencer Sands</td>
<td><strong>Implementing a Hardware Security Policy for Tock OS</strong></td>
</tr>
<tr>
<td>Austin Wang</td>
<td><strong>Improved Transformer Architecture for Sequence to Sequence Translation</strong></td>
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LET’S GET STARTED!
What Is Independent Work?

Independent Work (IW) is an individual project to study a novel idea in depth.

Examples:
- Novel algorithm
- Novel system design
- Novel problem formulation
- Novel benchmark suite
- Novel proof of a theorem
- Novel application
- Novel investigation of a dataset
- Novel...
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-term 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 One-Term Projects

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>TBD:</td>
<td>AB JIW Funding Information</td>
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<tr>
<td>October 2:</td>
<td>Written Project Proposal due, 11:59pm</td>
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<tr>
<td>TBD</td>
<td>BSE Funding Deadline</td>
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<tr>
<td>October 20:</td>
<td>Checkpoint Form due, 11:59pm</td>
</tr>
<tr>
<td>November 11:</td>
<td>Attend How to Give an IW Talk, 4:30pm, CS 105</td>
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<td>November 18-22:</td>
<td>Sign up for an Oral Presentation Time Slot on WASE, if not presenting in a seminar or research group</td>
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<tr>
<td>December 3:</td>
<td>Attend How to Write an IW Paper, 4:30pm, CS 105</td>
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<tr>
<td>December 8:</td>
<td>Oral Presentation Slides due, 11:59pm</td>
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<td>December 9-13:</td>
<td>In-Person Oral Presentation</td>
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<tr>
<td>January 7:</td>
<td>Written Final Report due, 11:59pm</td>
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Important Steps and Deadlines:
Two-Term/Thesis

- October 2: Written Project Proposal due, 11:59pm
- October 20: Checkpoint Form due, 11:59pm
- November 11: Attend How to Give an IW Talk, 4:30pm, CS 105
- December 3: Attend How to Write an IW Paper, 4:30pm, CS 105
- February 3: Second Reader due, 11:59pm (only for Thesis)
- February 10: Draft Written Paper due, 11:59pm
- March 30-April 3: Sign up for Oral Presentation Time Slot on WASE
- April 6: Final Written Paper due, 11:59pm
- April 19: Oral Presentation Slides due, 11:59pm
- April 20-24: In-Person Oral Presentations
QUESTIONS
SO FAR?
Onto the specifics...
Written Project Proposals (All IW Students)

Submit a written description of your project plan

Logistics:
- Due October 2, 11:59pm
- 1-2 page paper
- Submit PDF document via CS dropbox
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 (All IW Students)

- Write a short summary of what is done in the first half, and what is planned for the second half

Logistics:
- Due October 20, 11:59pm
- Write two paragraphs
- Get feedback from advisor
- Submit via IW portal
Checkpoint Form

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

Name*:
Juliana Wu (A.B. 2017)

Advisor*:
Funkhouse, Thomas

Project title*:

Approximate number of meetings with your advisor*:

Progress report*:

Progress to date:

Current difficulties:

Next steps:

Submit
Oral Presentation (One-Term Students, Only)

- Give a talk about what you’ve done over the whole semester
  - One-term students: 9 minutes
  - Talks are primarily given in IW seminars or advisor’s research group

Logistics:
- Attend “How to Give an IW Talk” on November 11
- Submit slides via CS dropbox by December 8 at 11:59pm.
- Give your talk, watch others, provide feedback
Oral Presentation (Two-Term/Thesis Students, Only)

- Give a talk about what you’ve done over the course of the year
  - Two-Term/Thesis students: 12 minutes

Logistics:

- Oral Presentations Week: April 20-24
- Attend “How to Give an IW Talk” on March 31
- Submit slides via CS dropbox by April 19 at 11:59pm.
- Give your talk, watch others, provide feedback
Written Final Report (All IW Students)

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

One-Term Projects
- Due January 7 by 11:59pm
- Attend “How to Write an IW Paper” on December 3, 2019
- Submit PDF via CS dropbox
- 20-25 pages, double-spaced, plus appendix

Two-Term/Thesis Projects
- Due April 6 by 11:59pm
- Attend “How to Write an IW Paper” on December 3, 2019
- Submit PDF via CS dropbox
- 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
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 February 3 by 11:59pm
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 10 by 11:59pm
- At least 4-5 pages, single spaced
- Submit PDF via CS dropbox
Spring In-Person Oral Presentation

Give a 12-minute talk about what you’ve done over the whole academic year

Logistics:

- April 20-24
- Thesis students sign up for oral presentation timeslot via WASE, March 30-April 3
- Counts as Senior Departmental Exam for AB Seniors
- Slides due in IW portal on Sunday, April 19 by 11:59pm
- Attend How to Give an IW Talk in November and/or March
- Utilize campus resources such as McGraw Center and Princeton Writes
https://iw.cs.princeton.edu/portal
Funding

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

- Available funds:
  - School of Engineering and Applied Science
    - Expect email soliciting proposals soon
    - Support up to ~$500
  - 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

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
Grading (Continued)

<table>
<thead>
<tr>
<th>A-level</th>
<th>B-level</th>
<th>C-level</th>
<th>D-level</th>
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<tbody>
<tr>
<td>New contribution – interesting, creative</td>
<td>Not-so-innovative contribution – variant of previous work</td>
<td>Not innovative</td>
<td>Nothing interesting attempted, nothing gained</td>
</tr>
<tr>
<td>Solid execution and results – refined and tested</td>
<td>Working execution and results – not fully refined and tested</td>
<td>Unfinished or not working implementation</td>
<td>Report is stream of consciousness</td>
</tr>
<tr>
<td>Excellent talks, papers – thoughtful, thorough</td>
<td></td>
<td>Report looks like workbook or lab report</td>
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<tr>
<td>Student has taken initiative and led project</td>
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Complete papers, talks, and posters – limited insights
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. Dobkin)
- 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

Piazza – Primary Resource

- Ask IW staff and other students questions about logistics, advice, toolkits, data sets, etc.
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
That pretty much covers it.

Let’s summarize the key points...
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!
Immediate Next Steps

- Read everything on the IW website
  - Important Steps and Deadlines
  - Guidelines and Useful Information
- 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
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 god project goal and novel approach
- Working hard in the first few weeks greatly reduces the chances of ending up with a weak project
THANKS!

Any questions?