Fall 2025

L01 Introduction

CS 1530 Software Engineering

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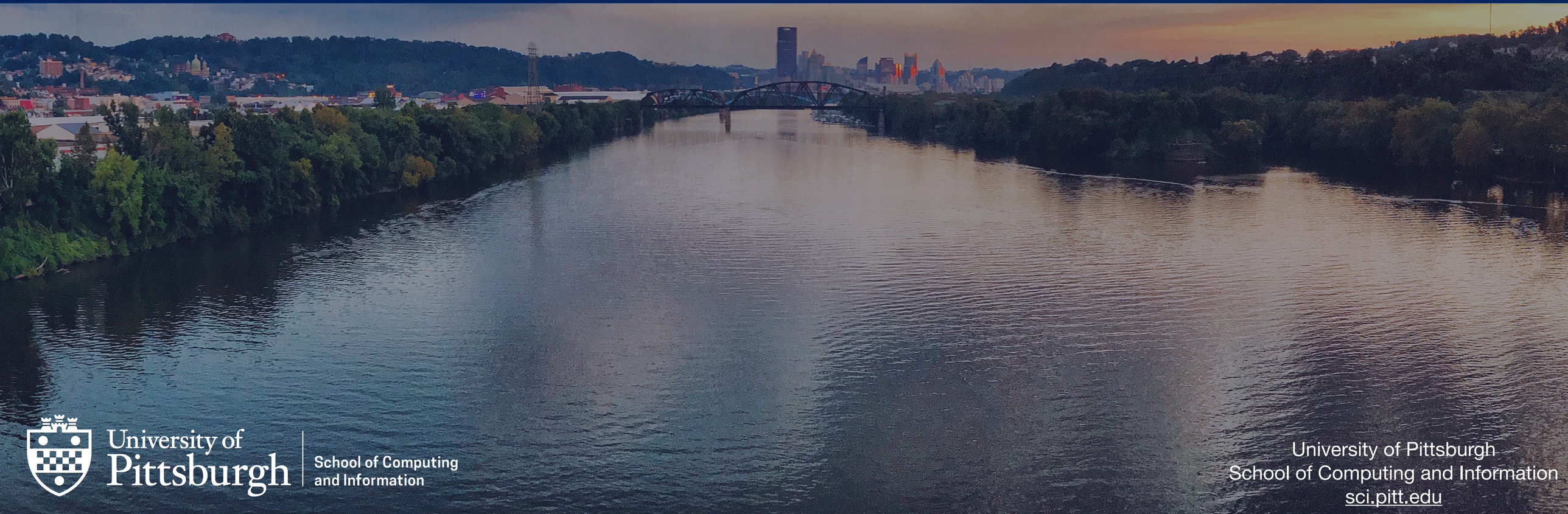

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- Material from these notes is obtained from various sources, including, but not limited to, the following:
  - Bruegge, & Dutoit. Object–oriented software engineering. using UML, patterns, and Java. Pearson, 2009.
  - Gamma, Erich, Richard Helm, Ralph Johnson, and John Vlissides. Design Patterns. Pearson, 1994.
  - Sommerville, Ian. "Software Engineering" Pearson. 2011.
  - http://scrum.org/

Today's roadmap

- Organizational & syllabus
  - Prerequisites
  - Learning goals & course organization
  - Grading
  - Tools
  - Communication & Feedback
- Q&A
- Intro to Software Engineering

Organizational matters

- Please review the syllabus & course policies on Canvas!
- If you need specific **accommodations**, please **email me & the DRS ASAP!**
- Make sure you fulfill the prerequisites for this course

Prerequisites & assumptions for this course

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- You have some programming experience
  - Previous experience with Java OR Python, C, C++, Visual Basic, …
  - Lecture code examples & coding homework assignments will be in Java
  - Team project (*more later*) can be in any language
- You have access to a computer and use it during the lectures

Material to refresh your knowledge (Java)

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- Interactive online tutorials
  - https://www.learnjavaonline.org
  - https://www.w3schools.com/java/
- Java tutorials covering the basics: https://docs.oracle.com/javase/tutorial/

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Course learning goals

- You know the most important software engineering terms and workflows
- You understand the basic concepts and phases of a software project
- You can apply suitable concepts and methods for concrete problems in complex projects
- You are familiar with and can apply problem-solving techniques
- You are able to analyze and evaluate given problems

Teaching philosophy

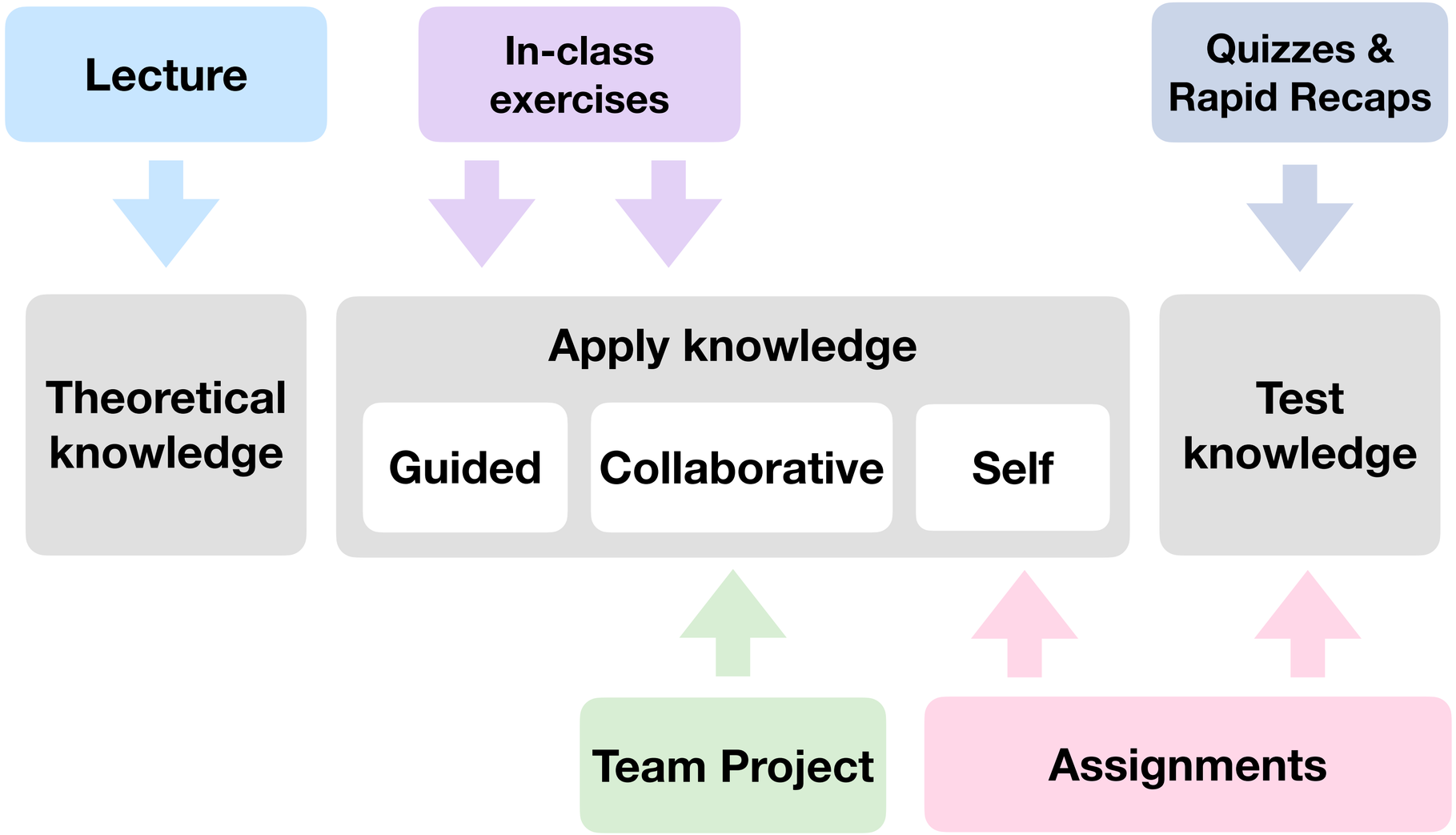
Tell me and I forget,

teach me and I remember,

involve me and I learn.

— Chinese proverb | Confucius

Teaching & learning framework



This course's roadmap

- Intro to Problem-Solving
- Model-based Engineering (UML)
- Software Development Lifecycle Models (Waterfall, Spiral, Agile, …)
- Requirements Engineering
- System Design and Architecture
- Object-Oriented Analysis and Design
- Design Patterns
- Software Testing and Quality Assurance
- Project Management in Software Engineering
- Software Configuration Management & Deployment

Order is subject to change

- User Interface Design and Usability
- Emerging Trends in Software Engineering (AI in SE, Blockchain, etc.)
- Verification and Validation

If time permits

Course organization — Lectures

#	Date	Subject
1	08/26/2025	Introduction
	08/28/2025	
2	09/02/2025	Model-based Engineering
	09/04/2025	
3	09/09/2025	Requirements Analysis
	09/11/2025	
	…	…

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Grading — Scale

%	LG	Breakdown	
>= 90%	A	100% — 97%	A+
		96% — 94%	A
		93% — 90%	A-
>= 80%	B	89% — 87%	B+
		86% — 84%	B
		83% — 80%	B-
>= 70%	C	79% — 77%	C+
		76% — 74%	C
		73% — 70%	C-
>= 60%	D	69% — 67%	D+
		66% — 64%	D
		63% — 60%	D-
< 60%	F	59% — 0%	F

Grading — Composition

- Rapid recaps (in-class) [10%]
- In-class exercises [20%]
- Individual Homework Assignments [30%]
  - You will complete several assignments on your own
  - More information soon!
- Team Project [40%]
  - In small teams, you will complete several assignments (more soon)
  - Each team must present their project (end of term)
- No exams :-)

Type	Percentage
In-class Rapid Recaps	**10%**
In-class Exercises	**20%**
Individual Homework Assignments	**30%**
Team Project	**40%**

Rapid Recaps (RRs) [10%]

- Short quiz questions about the previous week's content
- Every **Tuesday** at the beginning of class, **11:00 am on the dot** ⏰
- Open book, up to 5 questions, time will vary from ~ 3 - 10 min
- There are no repetitions! No exceptions!
- Your worst two RR results will be dropped

In-class Exercises [20%]

- You will be given some time in-class to work on a problem in **pairs**
- Follow-alongs or short exercises to be completed in class (latest by 11:59 pm)
  - E.g., programming exercises, modeling exercises, quiz questions, …
- After some time, a pair present their results
  - You receive feedback from peers & me
    - Allows you to adapt your solution before submitting it!
  - You see other solutions and understand other approaches
  - Practice communication skills

Individual Homework Assignments [30%] — Preview

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- Individual submissions
- Assignments allow you to apply & deepen your knowledge
- *More & schedule soon*

Team Project [40%] — Preview

- In small teams, you will work together on designing a software system (and implementing parts of it) throughout the term
- You will come up with your own idea / find someone with an idea
- Each team member must contribute somewhat equally (will be assessed!)
- Each team must present their system
- *More & schedule soon*

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Main course tools (1)

Canvas

- Access lecture material
- Take rapid recaps

TopHat

- Follow-along with the slides
- Complete in-class exercises

- Access & submit coding exercises (in-class, assignments)

Main course tools (2)

Discord

- Communicate with instructor, TA, & fellow students
- Ask general questions about the organization, lectures, and exercises
- Receive announcements
- You can find the invite link on Canvas

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"Life happens" - Late submissions & Extensions

- Reach out **asap** in case of medical/family/… emergencies
  - I will need some **proof**, e.g., doctor's note
    - (E.g., your roommate's friend's COVID test is NOT a valid form of proof)
  - **Alternative**:
    Reach out to **Lynnsey Doane** (led114@pitt.edu, Director of Student Success)
- Non-emergency late submissions/extensions
  - Please reach out if unsure how to handle a situation before the deadline (no later than 3 days past the due date)!
  - Late assignments/in-class exercises:
    see late policy in the syllabus
  - RR: in total, you can miss two
    (your best 10 RR scores will count)

!! Expectations — Questions (in-class & Discord)

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- **Ask questions!**
  - If asking a question "publicly" makes you a little uncomfortable, I still encourage you to do so; it will be good practice & benefit you in the long run (e.g., being more comfortable to ask questions in a job later on)
  - **THERE ARE NO STUPID QUESTIONS!**
  - Remember, you are here to **learn**!
    If you have a question, there is a high chance of someone else having the same question
  - If my/your TA's answer does not satisfy you, also please let do me/them know!
    What is obvious to us might not be obvious to you, but if we don't know, we can't change anything
- **If there are no questions, I will assume that everyone understood everything!**

Expectations — Feedback

- If you have any feedback, **please talk to me!**
- I can only make changes if I know about what's working for you and what isn't
  - Knowing what's working for you is important for me!
  - Don't wait for the surveys, please reach out anytime!
- There will be frequent questions/feedback TopHat discussions - do use them!
- There will be two 'official' surveys throughout the course
  - **Midterm evaluation**: 09/08 - 10/20/2025
  - **!! Final course evaluation: 11/17 - 12/07/2025**

Based on this feedback, I will make changes for the remainder of the semester

Most important one!

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Previous Knowledge

⏳ 5-10 min

📊 Survey

Please complete this survey by the end of today!

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Questions?
Concerns?
Feedback?

Useful websites every programmer should know & use

- Google 
- Stack Overflow 

- GitHub 
- Other useful websites:
  - Geeks for Geeks
  - SourceForge
  - Codecademy
  - CodeBeautify

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What are your expectations for this class?

Today's roadmap

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  - Grading
  - Tools
  - Communication & Feedback
- Q&A
- Mini-Intro to Software Engineering

What is software?

- Software is **complex**
  - Typically composed of many parts
- Software can be **complicated**
  - No sufficient documentation = not easy to understand
  - Often requires in-depth knowledge to make a change
- Building & maintaining software involves many **stakeholders**
  - E.g., developer, customer, user, …

What is software engineering?

Code?

Coding?

Software Engineering is not rocket science nor textbook knowledge

Software Engineering is the use of **common sense** and **discipline** to **solve real-world problems**

What is software engineering?

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- Software engineering is much more than 'just writing code'
  - Programming is a subset of software engineering!
- **Software engineering is the process of applying scientific principles to the design & creation of software**
  - Systematic approach to designing, building, testing, and maintaining software
  - Focuses on problem-solving and decision-making throughout the project lifecycle
  - Collaboration and teamwork across various roles & stakeholders
  - Emphasizes quality assurance, scalability, and sustainability
- Involves both technical and non-technical skills

Communication & project management

Key concepts in software engineering

- Software engineering builds on **problem-solving** abilities
  1. Understand the problem
  2. Propose a solution and a project plan
  3. Engineer a system using best practices and good design principles

The proposed solution is often called and used as a 'prototype'

- Software engineering is about **dealing with complexity**
  - Creating abstractions and models
  - Notations for abstractions
- Software engineering is concerned with **dealing with change**
  - Requirements elicitation, analysis, design, implementation, validation of the system, delivery and maintenance

Why you should learn about software engineering

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- Building software without discipline is crazy!
- Software is critical to society
  - Economy
  - Enterprises
  - Key part of many complex systems
  - Essential for designing products
  - Embedded in systems you are using daily
  - …
- Realizing large, complex projects is hard
- Software crisis (*more next lecture*)
- It’s fun 🤓

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RR00 - Demo

⏳ 2 min

⚡ Rapid Recap

Practice time!
(Today's results will count as a bonus 💪)

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How to build a complex system?

Where to start?

I01 — Group Exercise

⏳ 10 min

💬 In-class

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Problem Statement: *Imagine you're in a new city for the first time, and you're very hungry. You want to find a good place to eat but don't know the area.*
How would you go about solving this problem?

Your Task:

- Form small groups of 2 — 3 students
- Identify steps you would naturally need to solve this problem
- You now want to share your approach with many people in various cities!
- **Design & build this system:** *How many possible solutions are there? Which solution is correct? Where to start?*
- Share your results!

I1 - Defining a system

2 points

I01 — Group Exercise

⏳ 10 min

💬 In-class

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Problem Statement: *Imagine you're in a new city for the first time, and you're very hungry. You want to find a good place to eat but don't know the area. How would you go about solving this problem?*

Questions you might consider:

- What do you need to build this system?
- What assumptions are you making?
- How will the user interact with the system?
- How will you collect information about available restaurants?
- Are other stakeholders involved? Who are they?
- How will you measure the success of the system?
- What happens after you have built this system?
- …

Via **Gradescope**.
One submission per group, please!
You can add your group members after submitting the exercise.

I1 - Defining a system

2 points

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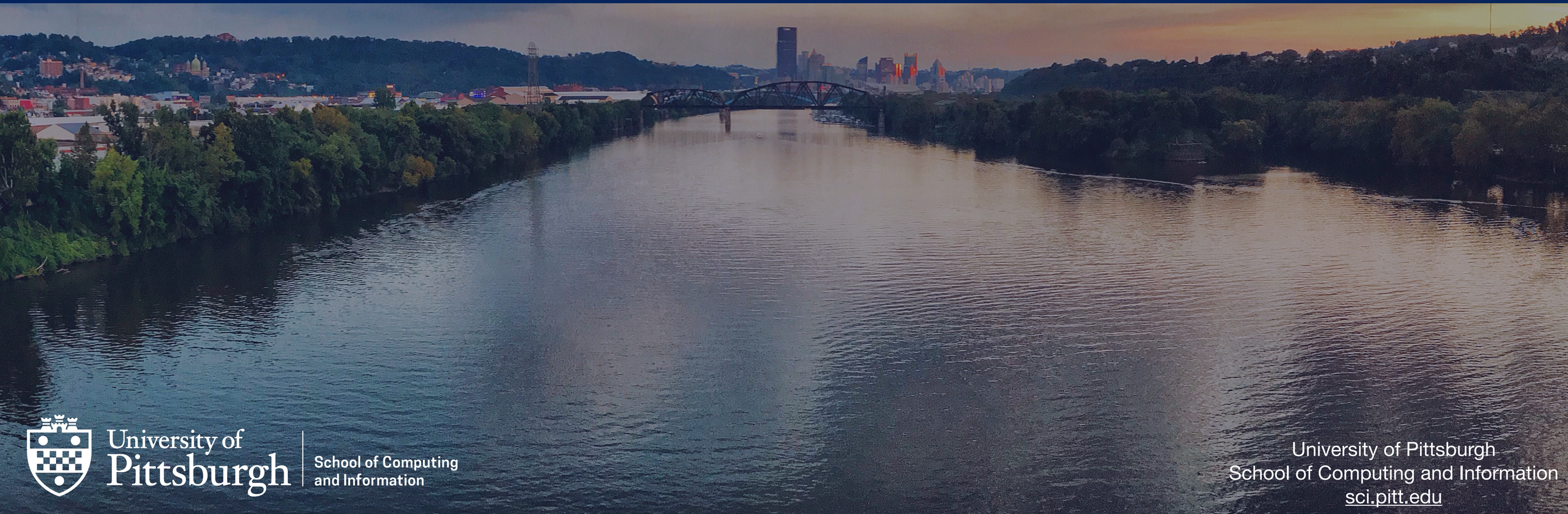

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