

CSE 142

**What is Computer Science?
What is Programming All About?**

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What is Computer Science?

- What do you think it is?



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What is Computer Science?

- What some people say:
 - "Computation"
 - "Formal system"
 - "Abstraction"
 - "Building computers"
 - "Programming", "Software Development", "Software Engineering"
 - ... "an ad hoc practice, with a little science inside, trying to get out" ...
- All of these (and others) have some truth
- Building a software system is often a matter of *modeling*

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What is a Model?

- Model: one thing that represents some other thing
 - A toy ship models a real ship
- Blueprints model a house
 - A doll house also models a house!
- A set of equations might model an ecosystem
- But a Model is *more* than a symbol or sign
 - A Model in some sense can be tested and studied to understand the real thing
 - A Model might exhibit behaviors or derive results



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What is modeling?

- What are some more examples of models?
- *Why* do people make models?
- *How* do people make models?
 - A medium is needed
 - Such as clay or balsa wood,
 - Or a descriptive or operational **Language**

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Programming as Modeling

- Take something real (bank, ship, house, university)
- Make a model in software of its objects, parts, relationships, etc.
- Or... **take something imaginary (video game world, scientific theory)**
 - Even though imaginary, it has objects, features, parts, relationships, etc.
- **Make a model in software of its (imaginary) objects, etc.**

Philosophical question: is the model itself real?

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What Can Get Modeled?

- Objects
- Parts of Objects
- Data
- Features
- Actions
- States
- Changes over time
- Patterns
- Relationships between the above
-

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Overview of CSE 142

- We'll learn how to model...
 - Objects
 - Relationships
 - Patterns
 - Data
 - Computation
- ...while learning how to create software systems using the Java programming language
- That is, the structures we describe & specify using Java are models, in effect

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The World of Objects

- The *object* is the basic unit of modeling in modern programming systems.
- We'll learn to think about *properties* and *responsibilities* of objects
 - Properties: information relevant to the object
 - Responsibilities: tasks an object can perform
 - In programming terms, these will be "Data" and "Methods"
- We'll learn to think about how objects relate to each other in a system
- Note: Modeling the world with objects in software is called *object-oriented programming (OOP)*.

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Student Example

- You are a student
- Let's model a *student object* in the context of a course registration system

- Name examples of relevant properties:

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Student Example (cont.)

- What are some responsibilities (tasks) for the student in a course registration system?

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Retail Store Example

- Let's model a system to store inventory of a retail store that sells men's and women's shoes

- Give some examples of objects in the system

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Retail Store Example (cont.)

- Object Properties Responsibilities

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Summary

- Model-building is a common human activity
- Modeling involves identifying objects and discovering their properties and relationship
- Building a piece of software is a form of modeling
- Modeling the world with objects in software is called object-oriented programming
- Objects have properties and responsibilities
- Modeling includes developing abstractions for objects and creating relationships among objects

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