

SAAST Computer Science (Summer 2014)

About

In this course, we survey the breadth of the field of computer science. We do so by studying *computational thinking*, a mindset to solving problems that all computer scientists share. To make this concrete, we practice computational thinking by learning how to program in the [Python](#) programming language.

Format

[SAAST](#) is an advanced program for high school students, giving them a full dose of a college-level course while experiencing the University of Pennsylvania first-hand. It's breadth is comparable to the department's own "CS1" introductory course ([CIS 110](#)) but compressed to fit into three weeks of July. This course meets daily in [Moore 207](#) from 9:00 AM to 5:00 PM each weekday. Each day is typically structured as follows:

- First session: 9:00 AM - 11:30 AM
- Lunch: 11:30 AM - 1:00 PM
- Second session: 1:00 PM - 3:00 PM
- Break: 3:00 PM - 3:30 PM
- Third session: 3:30 PM - 5:00 PM

Each session is comprised of lectures, guided programming exercises, and lab time to work on homework assignments and projects. Homeworks are assigned daily with the expectation that they are completed the next day. Projects are assigned approximately halfway through the week and are expected to be completed over the weekend.

Schedule

Week 1 (Project: Computer Art)

- Day 0 (7/7): Introduction, Logistics, and Setup
 - *Topics: Computer Science as Computational Thinking*
 - Homework 0: [Pythonbots](#)
- Day 1 (7/8): Primitive Types, Expressions, and Functions
 - *Topics: Primitive types, expressions, substitutive model of computation, functions*
 - Homework 1: [Song of Love](#)
- Day 2 (7/9): Aggregate Types: Tuples and Lists
 - *Topics: Aggregate types, tuples, lists, map/fold/filter operations*
 - Homework 2: [ISBN codes](#)
- Day 3 (7/10): Decomposition and Program Design
 - *Topics: Functional decomposition, debugging*
 - Homework 3: Programming Practice Problems

- Homework 4: Sentence Generator (part 1)
- Day 4 (7/11): Recursive Decomposition
 - *Topics: Recursion*
 - [drawingpanel.py](#)
 - Homework 5: [Sierpinski triangles](#)

Week 2 (Project: [Encryption Scavenger Hunt](#))

- Day 5 (7/14): Imperative Computation
 - *Topics: File IO, iteration/looping, stack-heap model of computation*
 - Homework 6: [DNA](#)
 - Sentence Generator (part 2)
 - Homework 7: [Loot Generator](#)
- Day 6 (7/15): Introduction to Object-oriented Programming
 - *Topics: Object-oriented design, classes*
 - Homework 8: [Speed Reader](#)
- Day 7 (7/16): (Field trip to [facebook](#) and [MongoDB](#))
- Day 8 (7/17): Project 2 work time
 - *Topics: Careers in computer science*
- Day 9 (7/18): Project 2 work time (cont.)

Week 3 (Project: Microgames)

- Day 10 (7/21): Introduction to the [Pygame](#) Framework
 - *Topics: Inheritance, (object-oriented) interfaces, Pygame*
 - [Microgames testing framework](#)
- Day 11 (7/22): Project 3 work time
- Day 12 (7/23): Project 3 work time (cont.)
 - *Topics: The information age (the good)*
- Day 13 (7/24): Project 3 work time (cont.)
 - *Topics: The information age (the bad and the ugly)*
- Day 14 (7/25): Final project presentations and graduation
 - [Microgames 2014 framework \(no games\)](#)
 - [Microgames 2014 final game](#) (note: 260 MB!)

Projects

Computer Art

[Microgames: Mom's Spaghetti](#)

Previous year's projects:

- 2013 - [Computer Art](#), [Microgames](#)
- 2012 - [Computer Art](#), [Microgames](#)