

# CS 346U: Exploring Complexity in Science and Technology

## Week 7 Assignment

Due Monday, November 18

**I. Watch videos** for Unit 7 on <http://complexityexplorer.org>

**II. Reading:** Textbook, Chapter 12

**III. Exercises** (Ungraded and not turned in):

- All quizzes and exercises in Unit 7. Do these **before** you do the Unit 6 test.

**IV. Unit 7 test** (complete and submit online).

**V. Assignments to turn in**

**1.** In Chapter 12 of *Complexity: A Guided Tour*, it is stated that in biological systems, “Information must be communicated via spatial and temporal sampling”. Write a paragraph discussing what this means in the context of task-allocation in ants. What information is communicated, and what kind of spatial and temporal sampling is done?

**2.** In Chapter 12 of *Complexity: A Guided Tour*, it is stated that in biological systems, “the actions of the system need to have random (or at least “unpredictable”) components. Give three examples of such “random” components in biological systems that we have discussed. For each of your examples, write a sentence or two explaining how the randomness (or unpredictability) is important for the system’s success.

**3.** If you haven’t already done so, write an abstract for final project (one or two paragraphs describing what you plan to do, along with list of at least two papers you will read on the topic of your simulation).

**4.** Build a NetLogo bird-flocking simulation that uses the following three rules:

- **Separation:** a bird will turn to avoid another bird which gets too close
  - **Alignment:** A bird tends to turn so that it is moving in the same direction as nearby birds
  - **Cohesion:** A bird moves towards other nearby birds (but doesn’t get too close)
- (We’ll work on this together in class.)

**5.** Build a NetLogo firefly synchronization simulation that uses the synchronization rules described in the lectures. (We’ll work on this together in class.)

**What to turn in:** Complete and submit the Unit 7 test online. Email a pdf document with your answers to Assignments 1-3, as well as your NetLogo models from Assignments 4-5 to [mm@cs.pdx.edu](mailto:mm@cs.pdx.edu).