

[EE381V] Programming with Molecules

Graduate Course :: Spring 2017

Prof. David Soloveichik

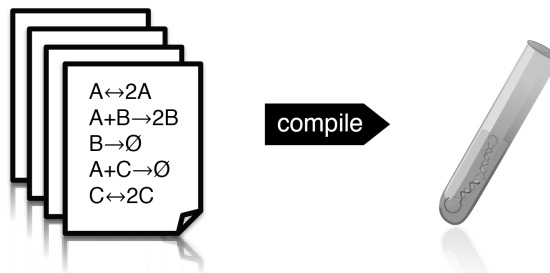
Lecture: T, TH 5-6:30pm in JES A305A

Office Hours:

W 2:00-3:00pm in POB 3.434

TA: Mengshi Zang

Office Hours: W 4-5pm in POB 5.110



Description

Computation is not a man-made phenomenon. From our brains to the regulatory networks of bacteria, nature provides fascinating examples of information processing, which is quite different from electronic computers. We will discuss formal models which help us discover the potential and limits of chemical and neural information processing. The motivating natural phenomena include information processing in chemical pathways in cells, biological self-organization, as well as human memory. We will study chemical and neural computation by reasoning, simulation, and formal proofs.

Prerequisites

Proof techniques (e.g., discrete math)

Undergraduate course in probability

Elementary differential equations

No biology or chemistry background is assumed.

Grading

Homework (65%), Project (30%), Class participation (5%)

Homework policy

Homework is due at the beginning of class. Late homework will be accepted only until the time when solutions are posted. The penalty will be -20% per 24 hour period. This penalty is assessed after normal grading and is cumulative with any points lost (e.g. a homework that would normally receive 80% of total points would receive only 40% if handed in within 48 hours). Late homework must be submitted via e-mail to the instructor and TA.

Collaboration policy

You may discuss homework problems with other students, but the solutions turned in must be written entirely by you. You must write the names of all the students you collaborated with at the top of your homework. Copying on homework assignments will result in an automatic zero for the assignment for both students as well as other consequences (e.g., failure and disciplinary action). Close collaboration is expected for group projects, with all students meaningfully contributing.

Textbook / reading materials

There is no textbook for this course. You are strongly urged to attend all classes and participate during discussions. Where possible, PDF copies of optional reading materials will be provided.

Major Topics

1. Chemical Reaction Networks
2. Algorithmic Self-Assembly
3. Neural Networks

University policies

Religious holy days. By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, I will give you an opportunity to complete the missed work within a reasonable time after the absence.

Students with Disabilities. The University of Texas provides on request appropriate academic accommodations for qualified students with disabilities. At the beginning of the semester, students who need special accommodations should notify the instructor by presenting a letter prepared by the Service for Students with Disabilities (SSD) Office. Disabilities range from visual, hearing, and movement impairments to Attention Deficit/Hyperactivity Disorder, psychological disorders (bipolar disorder, depression, Obsessive Compulsive Disorder, etc.), and chronic health conditions (diabetes, multiple sclerosis, cancer, etc.). These also include from temporary disabilities such as broken bones, recovery from surgery, etc. For more information, contact Services for Students with Disabilities at (512) 471-6259 [voice], (866) 329-3986 [video phone], via e-mail at ssd@austin.utexas.edu, or visit: <http://ddce.utexas.edu/disability/>.