



**2010 CMACS Workshop on
Modeling Biological Systems**

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Welcome!



Agenda

Today's agenda

- Welcome talk
 - Introductions
 - Logistics and paperwork
 - Workshop information
 - Schedule
 - Pedagogical approach
- First lectures
 - The cell cycle
 - Mac OS X and Unix
 - Signaling pathways

Introductions

EMACS What are we doing here?

- Preparation and recruiting for research internships and graduate school
- Exposure to research projects
- Interdisciplinary work experience
- Learn a few things




Introductions

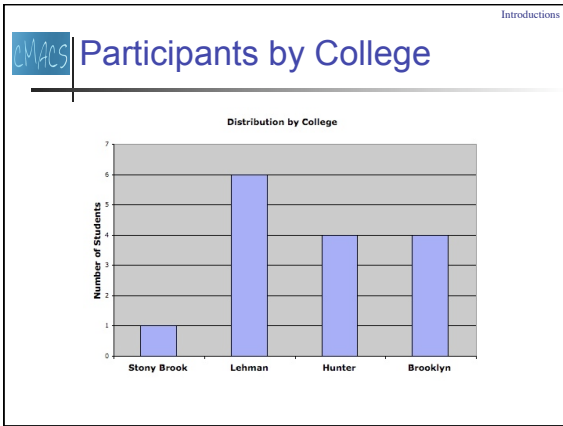
EMACS Staff

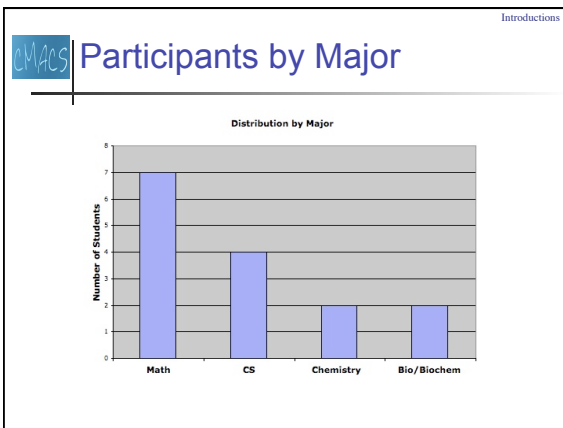
- Nancy Griffith: computer science
- Loes Olde Loohuis: computer science
- Ziping Liu: biology
- Fred Dieckamp: mathematics

Introductions

EMACS Visiting Lecturers

- Jim Faeder
 - University of Pittsburgh
 - Computational Biology
- Chris Langmead
 - Carnegie Mellon University
 - Computer Science
- Bud Mishra
 - New York University
 - Courant Institute





- EMACS Introductions
- ### Participants by Courses
- Calculus 1 and 2: 12/15
 - Biology 1 or 2: 5/15
 - Chemistry 1 or 2: 7/15
 - Computer Science: 8/15

Introductions

EMACS Participants

Time to introduce yourselves...

What's your college? Your major?
If you were an animal, what would you be?

Logistics and paperwork

EMACS Logistics

- What's important?
 - Cafeteria
 - Coffee
 - Bathrooms

Logistics and paperwork

EMACS Maps

Campus Map

Continuing Education/
Adult Degree

Win Room # 126
Win Room # 127
Win Room # 128
Win Room # 129

Seminar Room 141

Plaza

Operations

Start Offices

Cross walk
Sonic Pass Blue

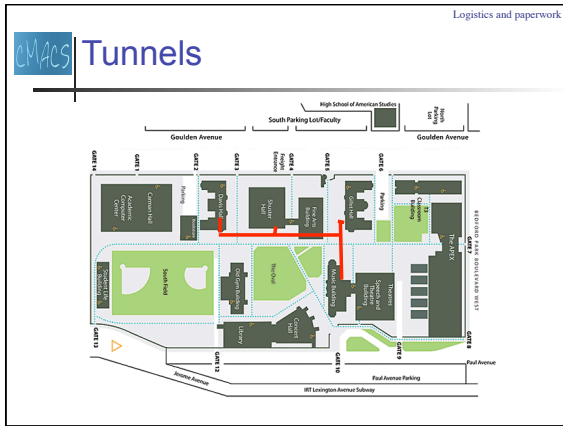
Open Area
Room # 188

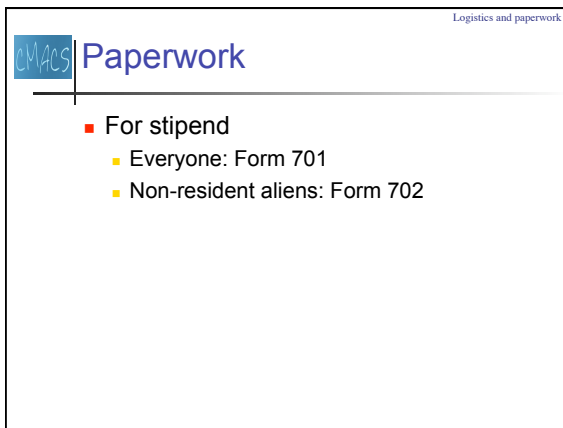
Help Desk

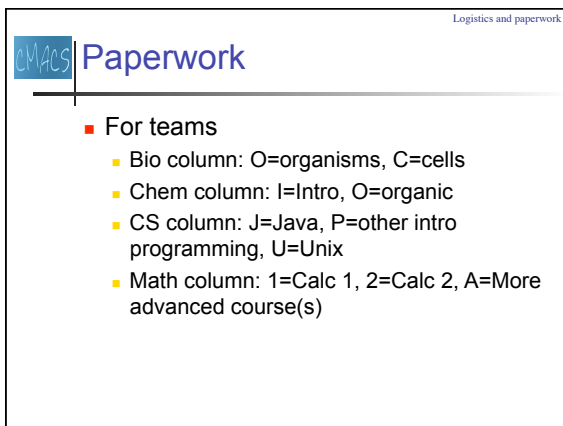
Misc Room # 107

RESTROOMS

■ Cafeteria







Workshop Information

EMACS Subject Matter

How to model signaling pathways, such as those that control cell proliferation

Figure 1. The Biology of Cancer (© Garland Science 2008)

Workshop Information>Schedule

EMACS Schedule

- This week: Introductory lectures
- Next week: Initial modeling problems
- Third week: Model checking
- Last two days
 - Team presentations
 - Final visiting lecture

Workshop Information>Pedagogical Approach

EMACS Pedagogical Approach

- Collaborative
 - Questions are always welcome
 - Discussion is encouraged!
 - Scribe to record unanswered questions
- Problem-oriented: three problems
 - Toy problem
 - Normal cell signaling pathway
 - Cancer cell signaling pathway

Workshop Information-Pedagogical Approach

EMACS Pedagogical Approach

- Interdisciplinary team oriented
 - At least 1 chemistry/biology expert
 - At least 1 computer science expert
 - At least 1 math expert

Workshop Information-Pedagogical Approach

EMACS Speaking of Interdisciplinary...

xkcd.com

Workshop Information-Pedagogical Approach

EMACS Learning Objectives

- Learn some hypotheses about how cancers develop
- Learn some techniques for modeling cellular signaling pathways
- Learn to function on interdisciplinary teams
- Investigate some research problems
- Meet new people and have some fun!



Specific Learning Objectives

- Learn how cells initiate cell division using signaling
- Investigate the mechanisms that initiate cell division and ensure that cells are copied accurately
- Learn to model *signaling pathways* that initiate cell division, using wiring diagrams and reaction rules
- Create computer-processable models of signaling pathways
 - Simulate their behavior
 - Investigate their properties
- Compare normal cell signaling behavior to cancer cell signaling behavior



Questions or Discussion?
