

BME-524X: GRADUATE SEMINAR IN COMPLEX SYSTEMS SCIENCE

Fall 2011 Wednesdays 9-10am @ BI-2221 (ITC Conference Room)

This course is a weekly seminar series that will serve students as a venue of active discussion on current research topics in complex systems science and interdisciplinary networking with the community of people who are interested in complex systems at BU and beyond. The objectives of the course are to help the students broaden their intellectual horizons and practice their presentation and scientific communication skills.

One half of the class meetings will be the bi-weekly Collective Dynamics of Complex Systems seminar series (<http://coco.binghamton.edu/>), while the other half will be on discussions and presentations on selected book chapters and/or journal articles. Students will be required to present either literature review or their own research at least once a semester and be graded based on class attendance, participation in discussions, weekly reflection essays, a presentation, and a final paper that is either (a) a research paper based on his/her own presentation, (b) a literature review that identifies some research questions worth further investigation, or (c) a research proposal. It will be offered in both Fall and Spring semesters.

Prerequisites:

Graduate standing or consent of the instructor.

Faculty:

Dr. Hiroki Sayama

Director, Collective Dynamics of Complex Systems Research Group

Assistant Professor, Departments of Bioengineering & Systems Science and Industrial Engineering

Affiliate, New England Complex Systems Institute

Biotechnology Building, Room BI-2627

Innovative Technologies Complex

Office Hours: Wednesdays 11:30am-12:30pm

Tel: 7-4439 Email: sayama@binghamton.edu

Reading Materials:

Required Textbook:

Complexity: A Guided Tour – Melanie Mitchell, ISBN # 978-0-19-512441-5, Oxford

University Press, 2009. (Kindle Edition is also available from Amazon.com)

In the first several class meetings we will discuss the chapters of this book “Complexity” by Melanie Mitchell, a leading scientist in complex systems science. **Each student must read the assigned chapters (about 100 pages of easy reading for general audience), write a one- or two-pages long reflection essay and email it to the instructor by one hour before the class starts (i.e. by 8am of Wednesday).** This will be printed and shared with the rest of the class and used in class discussion.

Other Recommended Readings:

Simply Complexity: A Clear Guide to Complexity Theory – Neil Johnson, ISBN # 1-85168-630-4, Oneworld Publications, 2009.

The Perfect Swarm: The Science of Complexity in Everyday Life – Len Fisher, ISBN # 978-0-465-01884-0, Basic Books, 2009.

Complex Adaptive Systems: An Introduction to Computational Models of Social Life – John H. Miller & Scott E. Page, ISBN # 0-691-12702-6, Princeton University Press, 2007.

Making Things Work: Solving Complex Problems in a Complex World – Yaneer Bar-Yam, ISBN # 0-9656328-2-2, NECSI Knowledge Press, 2004.

Complexity: The Emerging Science at the Edge of Order and Chaos – M. Mitchell Waldrop, ISBN # 0-671-87234-6, Simon & Schuster Paperbacks, 1992.

Course Schedule (seminar speakers are subject to change):

- 8/31 Course introduction
- 9/7 *CoCo Seminar: Chris Ruebeck (Lafayette College)*
- 9/14 **Mitchell “Complexity” Part I: Background and History**
- 9/21 *CoCo Seminar: Pam Mischen (Public Administration)*
- 9/28 **Mitchell “Complexity” Parts II & III: Life and Evolution in Computers, Computation Writ Large**
- 10/5 *CoCo Seminar: Jeff Schmidt (Systems Science)*
- 10/12 **Mitchell “Complexity” Parts IV & V: Network Thinking, Conclusion**
- 10/19 *CoCo Seminar: Scott Henkel (English, General Literature and Rhetoric)*
- 10/26 Student presentation (1)
- 11/2 *CoCo Seminar: Todd Guifoos (Economics)*
- 11/9 Student presentation (2)
- 11/16 *CoCo Seminar: Chanyu Hao and Andra Serban (Management)*

- 11/23 Student presentation (3)
- 11/30 *CoCo Seminar: Tom Raway (Systems Science)*
- 12/7 Final wrap-up discussions

After each class meeting, students should write a brief reflection of their own (a few paragraphs) on the topics and issues discussed in class, and post it to the Blackboard's discussion forum. This will be part of the reflection essays in the grading as well.

Grading System:

Class attendance	10
Participation in discussion	10
Weekly reflection essays	30
Presentation	25
Final paper	25

Total	100

Grade Categories (Percentage):

A	>= 90
A-	>= 85
B+	>= 80
B	>= 75
B-	>= 70
C+	>= 65
C	>= 60
C-	>= 55
D	>= 40
F	< 40

Other Important Points:

- **Incidents of academic dishonesty will be fully investigated and processed in accordance with university regulations.**
- **Accommodations:** If you are a student with a disability and wish to request accommodations, please notify me by the second week of class. You are also encouraged to contact the Office of Services for Students with Disabilities (SSD) at 777-2686. The SSD office makes formal recommendations regarding necessary and appropriate accommodations based on your specifically diagnosed disability. Information regarding your disability will be treated in a confidential manner.