

Concordia University
Political Science 486N/2 AA: Complexity in International Relations

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Fall 2013
Monday 6:00-8:15 pm
Office Hours: Monday 2:30-3:30 pm
and by appointment

Course Description and Objectives

This course takes an alternative approach to important questions and events in international relations in order to better understand how political, economic, and social phenomena might emerge within a complex system as often characterizes world politics. We focus on agents, including individuals, states, firms, and international organizations, and the connections between microfoundations and macroeffects in order to understand how small changes can make enormous differences in political and economic outcomes at the global level. The course uses ideas of emergence, evolution, feedback effects, and decentralized organization to examine environmental sustainability, ethnic conflict, global markets, financial crises, war, social networking, and global governance.

There are three primary objectives for this course:

- An understanding of the basic ideas of complexity, and how they might challenge fundamental assumptions within the dominant paradigms in international relations and produce alternative understandings of and expectations for political outcomes.
- Increased familiarity and comfort with agent-based modeling and computer simulation and its use to test theoretical arguments from international relations.
- Improved ability to think and argue analytically, both verbally and in writing.

Course Requirements

This course is designed as a seminar rather than a lecture. As such, students must read the required texts, attend class, and participate actively in class discussions in order for both the individual and the seminar to succeed. Your course grade will be based on class participation, short discussion papers, problem sets, and a seminar paper involving independent research.

Class Participation	20%
Seminar Paper (15-20 pages)	30%
Paper Proposal (3-4 pages)	10%
In-Class Research Presentation	10%
Problem Sets (3 5 pages)	30%

Seminar Paper: Students will be required to modify an appropriate agent-based model in order to better understand an issue of international relations to be selected by the student in consultation with the professor. The paper will include a discussion of the problem/issue, existing theoretical and empirical work on this topic, and an analysis of the results of their simulation. The paper is due on December 10th by 5 pm. Paper proposals of 3-4 pages are due in-class on Monday, October 21. Students will also give 10 minute presentations on their models and results during a make-up class on December 4.

Paper Proposal: Your paper proposal should include your issue/problem, your research question, initial hypotheses, and the type of model you wish to use. You should attach a one to two page initial bibliography (which must be properly formatted). More information will be given in class. You should plan to come to office hours during the first couple of weeks of the course to discuss potential paper topics.

In-Class Presentation: Presentations should be no more than 5-7 minutes. In your presentation you should address your research question, your interest in this topic, basic elements of your model, simulation results, as well as the larger implications of your research. Each presentation will be followed by Q and A to allow your classmates to ask you questions about your topic and research.

Problem Sets: Students will spend part of each class session learning about agent-based modeling using the computer program NetLogo. Three problem sets distributed over the course of the semester will allow you to test your understanding of basic modeling and design and run your own simulation, the results of which will be used in your term paper.

Readings

The following books are available at the Concordia Bookstore on the SGW campus as well as from Amazon.com, Amazon.ca, Barnes and Noble (bn.com), and other online booksellers (including www.half.com which has considerable discounts). These books are required reading for the course. There are additional readings in a course pack available for purchase at the Concordia University Bookstore as well as posted online on the course website.

Required:

John Gribbin, *Deep Simplicity* (New York: Random House, 2004). ISBN: 1400006256X

John H. Miller and Scott Page, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007). ISBN: 978-0-691-12702-6

Thomas C. Schelling, *Micromotives and Macrobehavior* (New York: W. W. Norton & Company, 2006). ISBN: 9780393329469

Lars-Erik Cederman, *Emergent Actors in World Politics: How States and Nations Develop and Dissolve* (Princeton: Princeton University Press, 1997). ISBN: 978-0-691-02148-5

Recommended:

Robert Jervis, *System Effects* (Princeton: Princeton University Press, 1997). ISBN: 0691026246

John Holland, *Hidden Order* (New York: Helix Books, 1995). ISBN: 9780201442304

Robert Axelrod, *The Complexity of Cooperation* (Princeton: Princeton University Press, 1997). ISBN: 0691015678

Links to readings from online journals will be posted on Moodle.

The Fine Print

Attendance

Class participation constitutes a significant part of your grade this semester. While attendance is not sufficient for class participation, it is a necessary first step. In order to have fruitful class discussions, students need to arrive on time and stay for the entirety of the class. As a disincentive to arriving late, the last student to class each session will be given the task of verbally summarizing the main points of that day at the end of class. (In the interests of fairness, this rule will apply to the professor as well as students.) A student will also be chosen at random to start off each class with a synopsis of the key idea(s) in the reading and their reactions (about 3-4 minutes).

Absences

The only excused absences are medically-related and require documentation from a doctor. The Political Science Department requires verification of all doctor's notes. In-class presentations cannot be made up unless it is a documented medical emergency.

Assignments

All assignments should be double-spaced, 12-point font, 1 inch margins, paginated, and stapled. Also double-check to ensure your name is on your work.

Late policy

One grade will be deducted for each day (24-hour period) that a problem set is late, starting from the deadline. One third of a grade will be deducted for each day (24-hour period) that the paper proposal is late. One full grade will be deducted for each day (24-hour period) that the final seminar paper is late, starting from the deadline, unless arrangements are made at least 2 weeks in advance of the deadline.

Course Website

Course documents, readings, and notices will be posted on Moodle, which can be accessed via MyConcordia. Be sure to check for new information periodically. Class handouts will also be posted to the website when possible to aid students in their studies. My notes, however, will not be available to students for any reason.

Disabilities

Please see me as soon as possible to make appropriate arrangements for any disabilities. You should also contact the Office of Student Services as soon as possible.

Extracurricular conflicts

Your academic studies have priority over your extracurricular activities and as such extracurricular activities do not constitute an excused absence. Furthermore, the due dates for all assignments are pre-set at the beginning of the semester. Therefore, I am very unlikely to change due dates or make exceptions for conflicts between course responsibilities and extracurricular activities. However, if you believe you are facing a conflict, the sooner you raise the issue, the more flexibility you provide, and the more likely we are to reach a mutually satisfactory solution.

Religious Holidays

You should see me as soon as possible (but certainly in advance of any holiday) to arrange a means of covering any class material you plan to miss for religious holidays. It is your responsibility to schedule short papers and presentations such that they do not fall on any religious holidays you observe.

Plagiarism

Department of Political Science Statement on Plagiarism

The Department has zero tolerance for plagiarism.

1. What is plagiarism? The University defines plagiarism as “The presentation of the work of another person, in whatever form, as one’s own or without proper acknowledgment.” (Concordia Undergraduate Calendar 2013/2014, page 57). Plagiarism is an academic offence governed by the Code of Conduct (Academic). To find out more about how to avoid plagiarism, see the Concordia University Student Learning Services guidelines at:

<http://cdev.concordia.ca/CnD/studentlearn/Help/handouts/WritingHO/AvoidingPlagiarism.html>

2. What are the consequences of getting caught? The Dean or an Academic Hearing Panel may impose the following sanctions on students caught plagiarizing:

a. Reprimand the student; b. Direct that a piece of work be re-submitted; c. Enter a grade of "0" for the piece of work in question; d. Enter a grade reduction in the course; e. Enter a failing grade for the course; f. Enter a failing grade and ineligibility for a supplemental examination or any other evaluative exercise for the course; g. Impose the obligation to take and pass courses of up to twenty-four (24) credits in addition to the total number of credits required for the student’s program as specified by the Dean. If the student is registered as an Independent student, the sanction will be imposed only if he or she applies and is accepted into a program; h. Impose a suspension for a period not to exceed six (6) academic terms. Suspensions shall entail the withdrawal of all University privileges, including the right to enter and be upon University premises; i. Expulsion from the University. Expulsion entails the permanent termination of all University privileges. (Undergraduate calendar, pages 60.)

Complete regulations can be found beginning on page 56 of the Undergraduate calendar.

3. See also The Political Science Department's "Resources on Avoiding Plagiarism" at:

<http://politicalscience.concordia.ca/plagiarism>

Changes of the Syllabus

I reserve the right to amend the schedule of meetings and assignments listed in this syllabus as might become necessary based on events throughout the semester. Any changes to the syllabus will be announced and students will receive an amended syllabus in writing. Copies of the most up to date syllabus can be found on the course website on Moodle.

Important University Dates

The last day to add or drop this class is September 16th.

Course Schedule

September 9: Introduction—What is Complexity? What is Agent-Based Modeling?

Murray Gell-Mann, “What is Complexity?” *Complexity* 1 (1995): 16-19.

W. Brian Arthur, “Why Do Things Become More Complex?” *Scientific American*, May 1993, pp. 144.

John Holland, “Complex Adaptive Systems,” *Daedalus* 121 (1992): 17-30.

From the NetLogo User’s Guide, read: <http://ccl.northwestern.edu/netlogo/docs/> “What is NetLogo?” and experiment with Sample Model: Party.

September 16: Origins of Complexity

John Gribbin, *Deep Simplicity: Bringing Order to Chaos and Complexity* (New York: Random House, 2004).

Basic Programming 1—Agents and Agent Commands

From the NetLogo User’s Guide, read <http://ccl.northwestern.edu/netlogo/docs/> Tutorial # 2 Commands.

September 23: Complexity in Political Science

Thomas S. Schelling, *Micromotives and Microbehavior* (New York: W. W. Norton & Co., 2006), chapters 1-4.

Scott Page and John Miller, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007), chapter 2 (pp. 9-32).

Matthew Hoffman and John Riley Jr. The Science of Political Science: Linearity or Complexity in Designing Social Inquiry. *New Political Science* 24(2): 303-320.

Basic Programming 2—Patches and Patch Commands

From the NetLogo User’s Guide, read <http://ccl.northwestern.edu/netlogo/docs/> Tutorial # 3 Procedures.

Sample Models:

Party: <http://ccl.northwestern.edu/netlogo/models/Party>

Flocking: <http://ccl.northwestern.edu/netlogo/models/Flocking>

Simple Model of Segregation: <http://ccl.northwestern.edu/netlogo/models/Segregation>

September 30: Complexity in IR

Robert Geyer and Steve Pickering. 2011. Applying the Tools of Complexity to the International Realm: From Fitness Landscapes to Complexity Cascades. *Cambridge Review of International Affairs* 24(1): 5-26.

Robert Jervis, *System Effects* (Princeton: Princeton University Press, 1997), chapter 2 (pp. 29-91).

Scott Page and John Miller, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007), chapter 8 (pp. 114-140).

Robert Axelrod, *The Complexity of Cooperation* (Princeton: Princeton University Press, 1997), chapter 4 (pp. 69-94).

Common ABMs 1—Rumors, Information, and Voting

Basic Model of Information Flow: <http://ccl.northwestern.edu/netlogo/models/RumorMill>

More Complicated Model: <http://ccl.northwestern.edu/netlogo/models/Fireflies>

Voting: <http://ccl.northwestern.edu/netlogo/models/Voting>

September 30: PROBLEM SET 1 DUE, START OF CLASS

October 7: Evolution and Adaptation

John Holland, *Hidden Order: How Adaptation Builds Complexity* (Basic Books, 1995), chapter 2.

Scott Page and John Miller, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007), chapter 7 (pp. 93-113).

Robert Axelrod, *The Complexity of Cooperation* (Princeton: Princeton University Press, 1997), chapters 1-3 (pp. 1-39).

Common ABMs 2—Cooperation

PD: <http://ccl.northwestern.edu/netlogo/models/PDBasic>

PD Iterated: <http://ccl.northwestern.edu/netlogo/models/PDTwoPersonIterated>

Cooperation: <http://ccl.northwestern.edu/netlogo/models/PDBasicEvolutionary>

October 21: Emergence

Scott Page and John Miller, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007), chapter 4 (pp. 44-54).

Lars-Erik Cederman, *Emergent Actors in World Politics: How States and Nations Develop and Dissolve* (Princeton: Princeton University Press, 1997), chapters 1-5.

Robert Axelrod, *The Complexity of Cooperation* (Princeton: Princeton University Press, 1997), chapter 6 (pp. 121-147).

Common ABMs 2—Conflict

Types in Anarchy (Greedy Cows) : <http://ccl.northwestern.edu/netlogo/models/Cooperation>

Rebellion (Civil Violence): <http://ccl.northwestern.edu/netlogo/models/Rebellion>

Sugarscape: <http://ccl.northwestern.edu/netlogo/models/Sugarscape1ImmediateGrowback>

October 21: Problem Set 2 DUE

October 28: Decentralization and Feedback Effects

Robert Jervis, *Systems Effects* (Princeton University Press, 1998), chapter 4, pp. 125-177.

Brian Arthur, “Competing Technologies, Increasing Returns, and Lock-In by Historical Events,” *The Economic Journal* 99 (1989): 116-131.

Kollman, Miller, and Page, “Decentralization and the Search for Policy Solutions,” *Journal of Law Economics and Organization* 16 (2000): 102-28.

Cohen, Michael D., James G. March, Johan P. Olsen, “A Garbage Can Model of Organizational Choice,” *Administrative Science Quarterly* Vol. 17, No. 1. (Mar., 1972), pp. 1-25.

Jean Boulton, “Complexity Theory and Implications for Policy Development,” *Emergence* 12(2): 31-40.

Common ABMs 3—Ecological Sustainability

Wolf-Sheep Predation: <http://ccl.northwestern.edu/netlogo/models/WolfSheepPredation>

Climate Change: <http://ccl.northwestern.edu/netlogo/models/ClimateChange>

Think about how to add “carbon sinks” to this model

November 4: Self-Organized Criticality

Per Bak and Kan Chen, “Self-Organized Criticality,” *Scientific American* (January 1991), pp. 46-53.

Scott Page and John Miller, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007), chapter 9, pp. 141-177.

Mark Granovetter, “Threshold Models of Collective Behavior,” *American Sociological Review* 83 (1978), pp. 1420-42.

Lars-Eric Cederman, “Modeling the Size of Wars: From Billiard Balls to Sandpiles.” *American Political Science Review* 97 (2002): 19-59.

Antoine Bousquet, “Complexity Theory and the War on Terror: Understanding the Self-Organizing Dynamics of Leaderless Jihad,” *Journal of International Relations and Development* 15 (2012): 345-69.

Common ABMs 4—Sandpile Model of Conflict and Revolution

Sand pile model: <http://ccl.northwestern.edu/netlogo/models/Sand>

November 4: PAPER PROPOSAL DUE

November 11: Networking

James Collins and Carson Chow, "It's a Small World," *Nature* 393 (1998), pp. 409-410.

Steven H. Strogatz, "Exploring Complex Networks," *Nature* 410 (2001), pp. 268-276.

Duncan Watts and Steven Strogatz, "Collective Dynamics of 'Small World' Networks," *Nature* 393 (1998), pp. 440-442.

Amanda Murdie and David Davis, "Looking in the Mirror: Comparing INGO Networks Across Issue Areas." *Review of International Organizations* 7(2012): 177-190.

Charli Carpenter, "Vetting the Advocacy Agenda: Network Centrality and the Paradox of Weapons Norms," *International Organization* 65 (2011): 69-102.

Common ABMs 5—Small World

The Oracle of Bacon (how many degrees are you?): <http://oracleofbacon.org/how.php>

Six Degrees of Separation?

http://scienceblogs.com/culturedish/2009/01/famous_six_degrees_of_separati.php

Small Worlds: <http://ccl.northwestern.edu/netlogo/models/SmallWorlds>

If you have time and wish to go further, look at Virus in a Network:

<http://ccl.northwestern.edu/netlogo/models/VirusonaNetwork>

November 18: Ethnic Conflict

Cederman, *Emergent Actors in International Relations*, chapters 6-9. (skim)

Bhavnani, Ravi, Michael G. Findley, and James H. Kuklinski. "Rumor Dynamics in Ethnic Violence." *Journal of Politics* (2009)

Barry Pozen, "The Security Dilemma and Ethnic Conflict," *Survival* vol. 35, no. 1, Spring 1993, pp. 27-47.

Flocking: <http://ccl.northwestern.edu/netlogo/models/Flocking>

Simple Model of Segregation: <http://ccl.northwestern.edu/netlogo/models/Segregation>

Ethnocentrism: <http://ccl.northwestern.edu/netlogo/models/Ethnocentrism>

November 18: PROBLEM SET 3 DUE, START OF CLASS

November 25: Stock Market and Financial Crisis

W. Brian Arthur, "Positive Feedbacks in the Economy," *Scientific American* (February 1990), pp. 92-99.

T. Lux and M. Marchesi, "Scaling and Criticality in a Stochastic Multi-Agent Model of a Financial Market," *Nature* 397 (6719) (1999): 498-500.

David Scharfstein and Jeremy Stein, "Herd Behavior and Investment," *American Economic Review* 80 (1990): 465-479.

Roberto Chang and Andres Velasco, "A Model of Financial Crises in Emerging Markets," *The Quarterly Journal of Economics*, Vol. 116, No. 2 (May, 2001), pp. 489-517

URL: <http://www.jstor.org/stable/2696471>

Investor Induction: <http://ccl.northwestern.edu/netlogo/models/ElFarol>

Financial Panic Model: <http://ccl.northwestern.edu/netlogo/models/Fire>

December 2: Programming Algorithms and Collecting Results

Miller and Page, *Complex Adaptive Systems*, Appendices A and B, pp. 231-255.

Agents: <http://ccl.northwestern.edu/netlogo/models/WolfSheepPredation>

Networks: <http://ccl.northwestern.edu/netlogo/models/TeamAssembly>

Patches: Bloodgood-Clough model on Moodle

Multiple Plots: <http://ccl.northwestern.edu/netlogo/models/TeamAssembly>

Capturing and Saving Data : <http://ccl.northwestern.edu/netlogo/models/AIDS>

How can you save the data the monitors now report?

December 4: Make-Up class for Presentations

December 10: FINAL PAPER DUE