

**Application for Rackham Interdisciplinary Workshop
2003-04**

Workshop title Complex Systems Advanced Academic Workshop (CSAAW)
Brief description of topic This workshop will cover the difficulties of completing a dissertation in complex systems within the limits of a traditional department.
Faculty sponsor(s): PLEASE GIVE CONTACT INFORMATION Rick Riolo rriolo@umich.edu Center for the Study of Complex Systems 4485 Randall Lab 1120 734-763-3323
Graduate Student coordinator(s): PLEASE GIVE CONTACT INFORMATION William Rand wrand@umich.edu Kristin Hassmiller khassmil@umich.edu Center for the Study of Complex Systems Health Management and Policy 4485 Randall Lab 1120 M31110 School of Public Health II 734-763-3301 734-936-0939
Administrative unit: PLEASE GIVE CONTACT INFORMATION Please note : it is advisable to confirm the willingness of the head of the unit and establish which staff member will be responsible. This will be verified by Rackham after the award is made and before funds are transferred. No funds will be transferred without a designated signer. Center for the Study of Complex Systems Mita Gibson 4485C Randall Lab 1120 734-615-8990
Total amount requested: \$6,000.00
Date of submission 11/3/03

- Please attach
- (1) topic statement (500 words or less) and list of planned activities,
 - (2) proposed budget,
 - (3) list of participants, with status and affiliations,
 - (4) CVs (2-3 pages preferred) for the graduate student coordinator(s) and faculty sponsor(s).

Topic Statement

The study of Complex Systems is rapidly spreading across a wide variety of disciplines, including the natural sciences, social science, and even engineering. Writing in 2000, physicist Stephen Hawking said "...the next century will be the century of complexity." This is reflected in the large and growing number of scholarly and publicly accessible articles and books on complex systems. A search on Google for "complex systems" yields about one million hits!

To address this broad interest, the University of Michigan has established the Center for the Study of Complex Systems (CSCS), a broadly interdisciplinary program at the University of Michigan. Participating faculty and students represent nearly every college of the University. CSCS is based on the recognition that many different kinds of systems, each composed of many diverse agents interacting through various networks to generate self-regulation, feedback or adaptation, may have common underlying dynamics and structure despite their apparent differences. Moreover, these deep structural similarities can be exploited to transfer methods of understanding from one field to another.

Through Rackham, CSCS offers a Graduate Certificate program to provide a program of study for graduate students who are interested in learning the basic concepts of complex systems. However, CSCS does not provide a Ph.D. degree program; instead, students pursue a Ph.D. through regular departments. While this grounding in a traditional discipline has many merits, it also means that it is difficult for students who have finished taking CSCS classes and have begun their dissertations to maintain the interdisciplinary contacts which are a *sine qua non* of complex systems research. Further, the dissertation writing period is just when many students need the most assistance, as they attempt to develop and defend a dissertation that uses new and interdisciplinary techniques.

The goal of the proposed Complex Systems Advanced Academic Workshop (CSAAW) is to support students who are writing dissertations that involve the inherently interdisciplinary ideas and techniques of complex systems research. The core group organizing the CSAAW workshop includes eleven dissertation students from ten different departments. Through a series of meetings, students will discuss their own work with the participants in the workshop. They will also have the opportunity to bring in external researchers in Complex Systems (See the Activities section in this proposal for details.) Besides the core group of students, twenty-one students and faculty from nine different departments have expressed interest in attending the meetings. By fostering the interaction of a group of researchers spread across so many areas of interest, it is hoped that not only will the students be able to write their dissertations, but we will also encourage joint research projects and allow students who are open to interdisciplinary work to learn about tools and methods that are common in areas different from their home disciplines. CSAAW also will reduce the isolation of students in their disciplines and allow them to remain connected to complex systems literature and community. In addition CSAAW will help students successfully integrate into mainstream academic disciplines despite the unconventional nature of their dissertation research.

In sum, with the assistance of the Rackham Interdisciplinary Workshop funds, we will provide an opportunity for advanced graduate students who are spread throughout the University to meet and interact with other students and faculty who share their interests in interdisciplinary methods for studying complex systems.

List of Planned Activities

The CSAAW workshop would meet approximately every two weeks until the end of May, 2004. The time and place will be determined by the core members at an initial organizational meeting. The faculty adviser (R. Riolo) will attend as many meetings as possible, but at least once a month.

There will be a variety of activities involved in the workshop meetings, but the majority of activities would focus around three types of activities:

1) Meetings in which dissertation students will have the opportunity to present and discuss research they are doing or are considering doing, in particular highlighting any difficulties they are having with regards to carrying out multi-disciplinary complex systems related work within traditional departments. Participants will discuss strategies for organizing, carrying out and defending interdisciplinary and non-traditional dissertations. As of the writing of this proposal, the "core" group of students who will present and discuss their work is listed in the participants list included in this application.

2) Outside speakers will be brought in to give talks and engage in discussions about complex systems research in general, and their own research in particular. Some of these speakers will be recent graduates who have completed dissertations that involved complex systems approaches and interdisciplinary work, and who therefore will be able to address the specific problems facing students who are trying to complete dissertations that cut across traditional boundaries and use the novel approaches being developed and applied in complex systems research projects. They also will be able to discuss their experiences as recent graduates on the job market and as new faculty, again addressing the unique problems facing students who are trying to include interdisciplinary complex systems approaches in their research plans. Some of the possible external speakers who graduated from the University of Michigan include:

- Scott Peacor, Ecology, Michigan State University
- Corinne Coen, Organization and Human Resources, SUNY Buffalo
- Lars Erik Cederman, International Conflict Research, ETH Zurich
- Ravi Bhavnani, Political Science, University of Illinois at Urbana-Champaign
- Stephanie Forrest, Computer Science, University of New Mexico
- Melanie Mitchell, Computer Science, Oregon Health and Science University

Other possible speakers include:

- Rob Axtell, Economic and Governance Studies, Brookings and John Hopkins University
- Paul Johnson, Political Science, University of Kansas
- Leigh Testfason, Economics, Iowa State University
- Troy Tassier, Economics, Fordham University
- David O'Sullivan, Geography, Pennsylvania State University
- Paul Torrens, Geography, University of Utah
- Cosma Shalizi, Complex Systems, University of Michigan

3) Some sessions may be devoted to reading specific complex systems research, or reading papers that address methodological or epistemological issues related to complex systems research. The topics will be determined by the core group.

Note that the CSAAW workshop sessions will be in addition to and in some cases coordinated with the activities of the ongoing Complex Systems Reading Group (CSRG), a student organized and run group that meets on a weekly basis to discuss recent advances within Complex Systems. The workshop also may coordinate some activities to take advantage of opportunities presented by the speakers brought in by CSCS for its regular weekly seminar series.

Finally, ad hoc meetings will be called as needed to help in the organization and preparation for the overall workshop and ongoing workshop sessions.

**Application for Rackham Interdisciplinary Workshop
2003-04**

Proposed Budget	
Stipend for Graduate Student Coordinators (2 @ \$750)	\$ 1,500
Administrative Assistance	\$ 500
Faculty Research Account Contribution	\$ 500
Refreshments	\$ 1,000
Speaker Travel and Honoraria	\$ 2,500
Total	\$ 6,000

Core Members

William Rand	PhD Student, EECS, Coordinator
Kristin Hassmiller	PhD Student, Health Management and Policy, Coordinator
Rick Riolo	Research Scientist, CSCS, Coordinator
Chris Warren	Research Fellow, Physics
Ariane Bazan	Research Fellow, Psychology
Ted Belding	PhD Student, EECS
Boris Mitavskiy	PhD Student, Math
Moira Zellner	PhD Student, UTEP
Derek Robinson	PhD Student, Resource Ecology and Management
Veronica Reyna	PhD Student, Political Science
Katia Koelle	PhD Student, Ecology and Evolutionary Biology
Michael Gastner	PhD Student, Physics
Matt Petering	PhD Student, IOE
Mary Johnson	PhD Student, Environmental Health Sciences

Additional Participants

Jose Benki	Professor, Linguistics
Teresa Satterfield	Professor, Linguistics
Betsy Foxman	Professor, Epidemiology
Jim Koopman	Professor, Epidemiology
Franco Nori	Professor, Physics
Cosma Shalizi	Research Fellow, CSCS
Li An	Research Fellow, SNRE
Kathryn Jacobsen	PhD Student, Epidemiology
Chris Riolo	PhD Student, Epidemiology
Thomas Riggs	PhD Student, Epidemiology
Ximin Lin	PhD Student, Epidemiology
Ross Hammond	PhD Student, Political Science
Juyong Park	PhD Student, Physics
Fred Jin	PhD Student, Physics
Darby Grande	PhD Student, IOE
Tom Litow	Graduate Student, Psychology
Bruce Graham	Graduate Student, Financial Engineering