

A Computational Science Program at UTK

**Interdisciplinary Graduate Minor
Computational Science (IGMCS)**

<http://citr.cs.utk.edu/igmcs/>

IGMCS Meeting February 26, 2007

- Current status of IGMCS 
- Program Committee
- IGMCS Student Form
- Recruiting students and departments
 - IGMCS Flyer
 - Perhaps Spring event for the University

Status of the IGMCS Program

- Approved by Curriculum Committee of the Graduate Council on April 15th, 2006
- Approved by full Graduate Council on April 27th, 2006
- Website: <http://citr.cs.utk.edu/igmcs/>
 - Change to a Wiki or leave as a website?
 - Will be changed to <http://igmcs.utk.edu/>
- Will appear in 2007 Graduate Catalog
 - <http://igmcs.utk.edu/CatalogCopy.pdf>

For a Participating Department

- **Template for the notice in the Graduate Catalogue From IGMCS**

- The Department of <Department Name> participates in the Interdisciplinary Graduate Minor in Computational Science (IGMCS) program. Any student pursuing a Masters or Ph.D. in <Department Name> can receive a Minor in Computational Science by completing the appropriate IGMCS requirements. For further information see the description of the IGMCS listed under the Department of Computer Science. The Department of <Department Name> also contributes courses to the IGMCS program curriculum.

Program Committee

- IGMCS Program Committee (6 to 8 people)
 - Subset of the Program Faculty
 - 1-2 representatives from each of the colleges involved
 - Renewable 2 year terms
 - Responsible for oversight: program requirements, approving courses and department programs, student course selection, etc

Proposed Program Committee

- Jack Dongarra, EECS (Chair)
- Thomas Papenbrock, Physics
- Chuck Collins, Math
- Jens Gregor, EECS
- Robert Hinde, Chemistry
- Cynthia Peterson, Biochem, Cellular & Molecular Bio
- Peiling Wang, School of Information Sciences
- David Keffer, Chem Engineering

Student Form

- Adapted from Stat's IGSP program.
- Working to have this form online.

THE UNIVERSITY OF TENNESSEE, KNOXVILLE (UTK) INTERDISCIPLINARY GRADUATE MINOR IN COMPUTATIONAL SCIENCE (IGMCS) PROGRAM

Student IGMCS Program Form

Instructions: To enroll in the program, fill out sections 1 through 7 below and submit to the IGMCS Program Committee Chair. If you have already completed at least one semester of study, also submit a copy of your transcript(s) (from UTK and/or other institution) and Admission to Candidacy form, if available. Upon completion of the IGMCS Program, fill in section 8 below.

- Student name _____ ID _____ Date _____
- Address _____ Phone # _____
City _____ State _____ Zip _____ e-mail _____
- College/Dept./Program _____ / _____ / _____
- Degree Objectives: (circle) Doctoral or Masters Target Completion Date _____
- Advisors: Major _____ IGMCS _____
Campus Address: _____

Note: The student's graduate committee must include an IGMCS Faculty Member.

6. IGMCS courses required for the minor:

COURSE NUMBER and NAME	DEPT.	WHEN TAKEN	GRADE
Masters (9 hrs) _____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

7. Approval of IGMCS program (to be completed prior to or during IGMCS program)

- Major advisor _____ Date _____
- IGMCS advisor _____ Date _____
- Major department's liaison to IGMCS Program Committee _____ Date _____
- IGMCS Program Committee Chair _____ Date _____

Copies to: Student, signers, major dept., Graduate School

8. Approval of completion of requirements for IGMCS program (to be completed after meeting IGMCS program requirements).

- Completion of Major courses:
Major advisor _____ Date _____
- Completion of IGMCS courses:
IGMCS advisor _____ Date _____
- Major portion of comprehensive exam passed:
Major advisor _____ Date _____
- Notification of completion of IGMCS program:
IGMCS Program Committee Chair _____ Date _____

Copies to: Student, Graduate School, major dept., major advisor, IGMCS advisor, Student's IGMCS file.

Recruitment and Departments

- The following departments have already developed courses
 - Electrical Engineering and Computer Science
 - Chemistry
 - Chemical Engineering
 - Information Science
 - Mathematics
 - Physics
 - Statistics
 - Geography
- How shall we engage other departments?

Flyer

■ Participating departments



The Interdisciplinary Graduate Minor in Computational Science (IGMCS)

Beginning Fall Semester 2007

Computational modeling and simulation have become indispensable tools in nearly every field of science and engineering, and people trained in Computational Science find themselves in very high demand, especially for the most exciting, leading edge work. But where can you go to learn the essentials of the truly interdisciplinary field of Computational Science? If you are pursuing a graduate degree in a particular discipline, this is not a simple problem. Computational Science integrates elements that are normally studied in different parts of the traditional curriculum, but which are not fully covered or combined by any one of them. To acquire the balanced package of knowledge and skills required to use computationally intensive methods well, students need a program that enables them to augment graduate work in their chosen field with a selection of courses from other disciplines that are specifically tailored to round out their education in Computational Science. UTK's new Interdisciplinary Graduate Minor in Computational Science (IGMCS) has been created to fulfill precisely that purpose.

The IGMCS enables a student to obtain a minor in Computational Science simultaneously with a graduate degree, at either the Masters or PhD level, in a participating department. Computational Science demands a basic level of understanding and skill in three discipline clusters — Mathematics, Computer/Information Science, and a "Domain Science," such as Physics, Geography, Biology, Chemical Engineering, etc. With guidance from participating faculty and departments, the IGMCS program allows students seeking an advanced degree in one of these areas to put together a small set of courses and internships tailored to their needs and filling out their understanding of Computational Science in a way that suits their particular background and advances their particular goals. By formally recognizing this work through a Minor in Computational Science, the IGMCS program is designed to increase the value of the graduate degree that students receive in their chosen field.

Course Requirements

The IGMCS requires a combination of course work from three disciplines - Computer Science, Mathematics, and a participating Science/Engineering domain (e.g., Chemical Engineering, Chemistry, Physics, etc.).

For students pursuing a Master's degree, 9 total hours of approved IGMCS courses are required consisting of 3 hours within the home discipline and 3 hours from each of the other two disciplines. For example, a student whose home department is Computer Science must complete 3 hours of approved Computer Science courses and 3 hours of approved courses in each of the other two discipline groups (Mathematics and domain science/engineering).

For students pursuing a PhD degree, 15 total hours of approved IGMCS courses are required, consisting of 6 hours within the home discipline and 9 hours from the other two disciplines (with a minimum of 3 hours from each). For example, a student whose home department is Physics must complete 6 hours of approved Physics courses and 9 hours of approved courses from Computer Science and Mathematics (with a minimum of 3 hours from each).

Degree	Hours required in home discipline	Hours required from two other disciplines	Total Hours
IGMCS at Master's Level	3	3 in each	9
IGMCS at PhD Level	6	9 (min. of 3 in each)	15

Additional Information IGMCS Website:
<http://ctr.cs.utk.edu/igmc/>

Contacts Dr. Terry Moore
(865) 974 - 5886
IGMCS Program
Suite 413
1122 Volunteer Blvd.
Knoxville, TN 37996
Dr. Jack Dongarra
(865) 974 - 8295

Spring Event on Campus to Promote the IGMCS

- Various things we could try here
- Example:
 - Hold a well advertised meeting where we talk about the new program
 - Ask the Chancellor to speak
 - Get Computational Scientists to talk about their work and opportunities
 - Someone from industry to talk about jobs
 - Someone from ORNL (Jeff Wadsworth or Thomas Zacharia?) to talk about opportunities at the lab
- Other Ideas?

To Do

- How can we recruit initial students to the program?
 - Advertise the program to students
 - Engage IGMCS faculty in the recruiting process
 - More ideas?
- Advertise the program to departments who may want to join the program
- Engage with departments to refine and fill out list of suitable IGMCS courses and begin development of new courses carefully tailored to the needs of students in the program
- Plan for the IGMCS Spring event.



Computational Science Involves a Chain or Cycle of Linked Series of Actions

- Domain science theory
- Mathematical modeling
- Algorithm development
- Software integration
- Hardware instantiation
- Domain science integration



The minor program will be build around this cycle of activities.

Computational Science is Interdisciplinary

- Students in one of the three general areas in Computational Science;
 - Applied Mathematics,
 - Computer & Info. Science, ECE, or
 - a Domain Science

will become exposed to and better versed in the other two areas that are currently outside their “home” area.

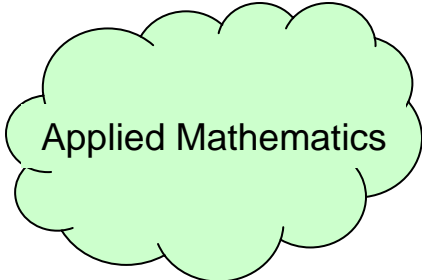
- A pool of courses which deals with each of the three main areas will be put together for students to select from.

Requirements

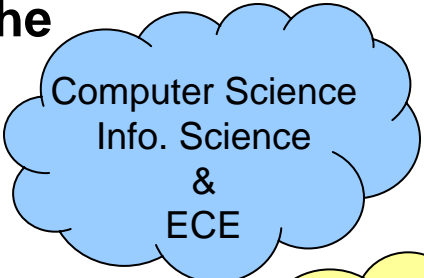
- **With guidance from their home department, students will lay out a program**
 - **Choice of courses must have the approval of the IGMCS Program Committee.**

- **At the Masters level a minor in Computational Science will require 9 hours (3 courses) from the pools.**
 - **At least 6 hours (2 courses) must be taken outside the student's home area.**
 - **Students must take at least 3 hours (1 course) from each of the 2 non-home areas**

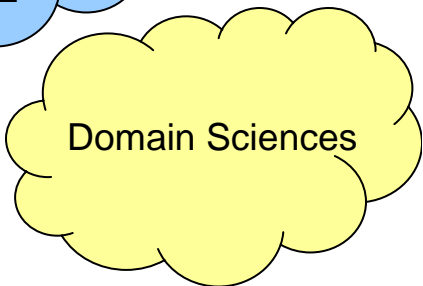
- **At the Doctoral level a minor in computation science will require 15 hours (5 courses) from the pools.**
 - **At least 9 hours (3 courses) must be taken outside the student's home area.**
 - **Students must take at least 3 hours (1 course) from each of the 2 non-home areas**



Applied Mathematics



Computer Science
Info. Science
&
ECE



Domain Sciences

Internship

- This is optional but strongly encouraged.
- Students in the program can fulfill 3 hrs. of their requirement through an Internship with researchers outside the student's major.
- The internship may be taken offsite, e.g. ORNL, or on campus by working with a faculty member in another department.
- Internships must have the approval of the IGMCS Program Committee.



How It Might Work For Students

Degree Program	Recognition Sought	Requirements
Master's in Home Dept.	Minor in Computational Science	9 hrs: 0-3 hrs in Dept. 6 hrs Outside Dept.
Doctorate in Home Dept.	Minor in Computational Science	15 hrs: 0-6 hrs in Dept. 9 hrs Outside Dept.

- Open to all students in departments with approved minor
- IGMCS Program Committee establishes an approved program/list of courses
- Home dept. must verify fulfillment of non-Computational Science degree requirements
- ORNL or other internship strongly encouraged

