FORMAT 1

Submit original with signatures + 1 copy + electronic copy to Faculty Senate (Box 7500).
See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	Physics Department	College/School	CNSM
Prepared by	Saundra Jefko	Phone	907-474-7347
Email Contact	physics@uaf.edu	Faculty Contact	Curt Szuberla

1. **ACTION DESIRED** (CHECK ONE): Trial Course [X] New Course [ ]

2. **COURSE IDENTIFICATION:** Dept: PHYS | Course #: F694 | No. of Credits: 3.0

Justify upper/lower division status & number of credits:

3. **PROPOSED COURSE TITLE:** Core Skills for Computational Science

4. **To be CROSS LISTED?** YES/NO: No | If yes, Dept: | Course #:
(Requires approval of both departments and deans involved. Add lines at end of form for additional required signatures.)

5. **To be STACKED?** YES/NO: No | If yes, Dept. | Course #:
Stacked course applications are reviewed by the (Undergraduate) Curricular Review Committee and by the Graduate Academic and Advising Committee. Creating two different syllabi—undergraduate and graduate versions—will help emphasize the different qualities of what are supposed to be two different courses. The committees will determine: 1) whether the two versions are sufficiently different (i.e. is there undergraduate and graduate level content being offered); 2) are undergraduates being overtaxed?; 3) are graduate students being undertaxed? In this context, the committees are looking out for the interests of the students taking the course. Typically, if either committee has qualms, they both do. More info online - see URL at top of this page.

6. **FREQUENCY OF OFFERING:** Fall
Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) – or As Demand Warrants

7. **SEMESTER & YEAR OF FIRST OFFERING** (AY2013-14 if approved by 3/1/2013; otherwise AY2014-15): Fall 2013

8. **COURSE FORMAT:**
NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply) [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [X] 6 weeks to full semester

OTHER FORMAT (specify)

Mode of delivery (specify lecture, field trips, labs, etc): LECTURES/LAB

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Dean's Office
College of Natural Science & Mathematics

Governance
3/11/13 TVP

9. CONTACT HOURS PER WEEK: | 35 | LECTURE hours/weeks | 16 | LAB hours /week | | PRACTICUM hours /week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/guidelines-for-computing-/ for more information on number of credits.

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

Example of a complete description:

FISH F487 W, O Fisheries Management
3 Credits Offered Spring
Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. *Prerequisites: COMM F131X or COMM F141X; ENGL F111X; ENGL F211X or ENGL F213X; ENGL F414; FISH F425; or permission of instructor.* Cross-listed with NRM F487. (3+0)

PHYS F694 F01 Core Skills for Computational Sciences 3.0 Offered Fall
Course description: This course provides students of computational sciences, an introduction to the basic skills required to operate in the modern high performance computing (HPC) environment offered at the Arctic Regional Supercomputing Center (ARSC). Topics include an introduction to HPC, basic Unix/batch/scripting skills, performance programming, shared and distributed memory parallelism, code validation and debugging, data storage and management, and data visualization. Each of these topics will be presented in lecture form. To provide additional applied knowledge, either a thorough case study by a guest speaker and/or a hands-on lab session will be given in support of each.

11. COURSE CLASSIFICATIONS: Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

H = Humanities | | S = Social Sciences | x

Will this course be used to fulfill a requirement for the baccalaureate core? **If YES, attach form.** | **YES:** | | **NO:** | x

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, **Format 6** | | W = Writing Intensive, **Format 7** | | Natural Science, ("X" for Core) **Format 8** | |

11.A Is course content related to northern, arctic or circumpolar studies? If yes, a "snowflake" symbol will be added in the printed Catalog, and flagged in Banner.

YES | | NO | X |

12. COURSE REPEATABILITY:

Is this course repeatable for credit? | **YES** | | **NO** | X

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

How many times may the course be repeated for credit? | | **TIMES**

If the course can be repeated for credit, what is the maximum number of credit hours that may be earned for this course? | | **CREDITS**

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course? | | **CREDITS**

13. GRADING SYSTEM: Specify only one. Note: Later changing the grading system for a course constitutes a Major Course Change.

LETTER: | X | **PASS/FAIL:** | |

RESTRICTIONS ON ENROLLMENT (if any)

14. *PREREQUISITES* **Graduate Standing in physical sciences, experience with FORTAN or C programming language, or permission of instructor.**

These will be *required* before the student is allowed to enroll in the course.

15. *SPECIAL RESTRICTIONS, CONDITIONS* **None**

16. *PROPOSED COURSE FEES* **$0**

Has a memo been submitted through your dean to the Provost for fee approval? **Yes/No**

17. *PREVIOUS HISTORY*

Has the course been offered as special topics or trial course previously? **Yes/No** **Y**

If yes, give semester, year, course #, etc.: Fall semesters 2005;2006;2007;2009;2010;2011;2012- PHYS693

18. *ESTIMATED IMPACT*

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

Tom Logan will need to be hired as Adjunct due to his expertise in the field. Budget impact would be $10,000 to CNSM/Physics Department.

19. *LIBRARY COLLECTIONS*

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No [X] Yes [ ] **No media required.**

20. *IMPACTS ON PROGRAMS/DEPTS*

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

Since this course has been offered as a Special topics class for a number of years there should be no real additional impact on other departments or overall additional positive or negative impacts on other courses or programs. However because this course has been taught for a number of years, and students from many departments have taken the course, not offering it could have an negative impact on overall computing ability in the graduate student population and the ability of a number of programs to effectively train their graduate students.

21. *POSITIVE AND NEGATIVE IMPACTS*

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

Since this course has been offered as a Special topics class for a number of years there should be no real additional impact on other departments or overall additional positive or negative impacts on other courses or programs. However because this course has been taught for a number of years, and students from many departments have taken the course, not offering it could have an negative impact on overall computing ability in the graduate student population and the ability of a number of programs to effectively train their graduate students.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

In order to meet the needs of modern science, though scientific computing, this course takes sutdents from an introduction to High Performance Computing, through to actual applications of High Performance Computing (including parallelization and optimization). The course includes a project that can be an application of these principles to a real work scientific code in the students' research area.

APPROVALS: Add additional signature lines as needed.

	Date	27 FEB 2013
Signature, Chair, Program/Department of:	**Curt Szuberla Physics**	
	Date	6 March 2013
Signature, Chair, College/School Curriculum Council for:	CNSM	
	Date	3/8/13
Signature, Dean, College/School of:	**Paul Layer College of Natural Science and Mathematics**	

Offerings above the level of approved programs must be approved in advance by the Provost.

	Date	
Signature of Provost (if above level of approved programs)		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	

Signature, Chair
Faculty Senate Review Committee: ___Curriculum Review ___GAAC
___Core Review ___SADAC

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

	Date	
Signature, Chair, Program/Department of:		
	Date	
Signature, Chair, College/School Curriculum Council for:		
	Date	
Signature, Dean, College/School of:		

Arctic Region Supercomputing Center

Supporting high performance computational research in science and engineering with emphasis on high latitudes and the arctic

Syllabus Online version

PHYS 693
Core Skills for Computational Science

Content

This course provides students of computational sciences an introduction to the basic skills required to operate in the modern high performance computing (HPC) environment offered at the Arctic Region Supercomputing Center (ARSC). Topics include an introduction to HPC, basic Unix/batch/scripting skills, performance programming, shared and distributed memory parallelism, code validation and debugging, data storage and management, and data visualization. Each of these topics will be presented in lecture form. To provide additional applied knowledge, either a thorough case study by a guest speaker and/or a hands-on lab session will be given in support of each.

PHYS 693 as ARSC User Training

In the past, components of this class have been regularly offered as individual training sessions by the staff at ARSC. The impetus for creation of the 'core skills' class was to provide a more intensive training environment for new student users, while still providing distinct modules for more advanced researchers to refresh/update skills.

As such, the PHYS 693 lectures are open to any interested individuals. While the structure, lectures, labs and grading policies of this course are designed for UAF students enrolled in the course for credit, the course doubles as ARSC user training. ARSC users and prospective ARSC users are strongly encouraged to attend any lectures they would find beneficial. There will be no other formal ARSC user training on these topics offered this fall.

Instructors

This course will be taught by several instructors including Arctic Region Supercomputing Center staff, UAF Physics department faculty and guest speakers.

Contacting Us

The primary points of contact for the class are:

Tom Logan, ARSC, WRRB 105, 450-8624, talogan@alaska.edu
Dr. David Newman, 112 NSF, 474-7858, denewman@alaska.edu

Links to Course Syllabus, Homework, and References

Schedule & Lectures Homework References

In approaching this (and all) classes, please note the following ancient chinese proverb: **Teachers can open the door, but you must enter by yourself.**

Prerequisites

Graduate standing in physical sciences; experience with FORTRAN or C programming language; or permission of instructor.

Lectures/Lab Meeting Time and Place

West Ridge Research Building 009, Tuesday/Thursday, 9:15 - 11:15am

Grading

The course grade will consist of the following components

Homeworks 40 %
Semester project 30 %
Mid-term 20 %
Attendance and Participation 10 %

Grading Components

Homework: There will be approximately one homework assignment per week. The assignment will be given out and posted on the web. These assignments help in assessing your understanding of the material, and will count as a major part of your final grade.

Project: There will be a semester project, which will require a final presentation and paper.

Mid-term Exam: A mid-term exam will be given.

Special Needs

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

Plagiarism

Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks which will be followed in this class. (Taken from the UAF plagiarism web site, which has many links with good information about this topic)

Complaints and Concerns

You are always welcome to talk to the instructors about anything, however, if you have a non-subject matter question or concern that cannot be resolved by the instructors contact the department chair, Dr. Chowdhury, Physics Department Office, room 118 Reichardt.

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Schedule and Lectures

PHYS 693
Core Skills for Computational Science

Class	Date	Instructor	Topic
1	30-Aug	TL	**Introduction to ARSC & HPC**
2	4-Sep	ON	**Introduction to Linux** / **Semester Project**
3	6-Sep	TL	**Data Management** / **Unix Scripting**
4	11-Sep	TL	**Introduction to Fortran, Part 1**
5	13-Sep	TL	Introduction to Fortran, Part 2 (Lab session)
6	18-Sep	TL	Introduction to **PACMAN** and **Fish** Supercomputers
7	20-Sep	TL	**Makefiles** (Lab session)
8	25-Sep	TL	**Viz 1: Basic Visualization Tools**
9	27-Sep	TL	Performance Programming **Part I Part II**
10	2-Oct	TL	Performance Programming **Part III**
11	4-Oct	TL	**Profiling** and **Introduction to CrayPat**
12	9-Oct	TL	**Parallel Processing Concepts** & **Parallel Shared Memory Programming, Part 1**
13	11-Oct	TL	Parallel Shared Memory Programming, Part 2
14	16-Oct	TL	Parallel Shared Memory Programming, Part 3 (Lab session)
15	18-Oct	DM	Parallel Programming Application (Example)
16	23-Oct	SM	**Viz 2: Importing Data and Graphics Formats**
17	25-Oct	SM	Viz 3: Animation 101 (Lab session)
18	30-Oct	TL	**--- MIDTERM EXAM ---**
19	1-Nov	TL	**Parallel Distributed Memory Programming, Part 1**
20	6-Nov	TL	Parallel Distributed Memory Programming, Part 2
21	8-Nov	TL	Parallel Distributed Memory Programming (Class Exercises), Part 3
22	13-Nov	TL	Parallel Distributed Memory Programming (Lab Session), Part 4
23	15-Nov	KH	**Parallel Programming Application (Example)**
24	20-Nov	EK	**Debugging Applications**
---	22-Nov	---	Thanksgiving Holiday
25	27-Nov	KH	**Version Control Systems**
26	29-Nov	TL	**How to Give Presentations** & **Answer Questions**
27	4-Dec	TL	**Introduction to Co-Array Fortran**
28	6-Dec	TL	Open Session - Project Work
29	13-Dec	TL	**-- Final Presentations - 9:15 AM --**

Key	Instructor	Position	E-mail	Office	Phone Ext
DM	Don Morton	Research Professor	Don.Morton@alaska.edu	WRRB 105	8679
EK	Ed Kornkven	HPC Specialist	eakornkven@alaska.edu	WRRB 105	8669
KH	Kate Hedstrom	Oceanographic Specialist	kshedstrom@alaska.edu	WRRB 105	8678
ON	Oralee Nudson	User Consultant	onudson@alaska.edu	WRRB 105	8637
SM	Sergei Maurits	HPC Specialist	samaurits@alaska.edu	WRRB 105	8697
TL	Tom Logan	Associate Faculty	talogan@alaska.edu	Elvey 511-G	5789

Thomas Logan - 11 December 2012, Tuesday 08:01

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Homework

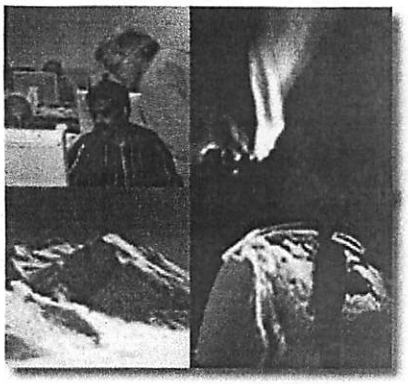
PHYS 693
Core Skills for Computational Science

Assigned Date	Due Date	Points	Homework
8/30	9/04	10	**Account Creation**
9/04	9/11	10	**Basic Unix Skills**
9/11	9/18	10	**Semester Project: Proposal for Project**
9/13	9/27	20	**FORTRAN**
9/27	10/11	10	**Semester Project: Code Profile**
10/11	10/23	20	**OpenMP**
10/23	11/8	20	**Visualization & Animation**
11/6	11/13	10	**Semester Project: Optimization, Parallelization, Visualization**
11/13	12/04	30	**MPI**

Thomas Logan - 30 October 2012, Tuesday 11:13

Arctic Region Supercomputing Center (ARSC) | PO Box 756020, Fairbanks, AK 99775 | voice: 907 -450-8600 | fax: 907-450-8603
For questions or comments regarding this website, contact **info@arsc.edu**

ARSC



Arctic Region Supercomputing Center

Supporting high performance computational research in science and engineering with emphasis on high latitudes and the arctic.

References

PHYS 693
Core Skills for Computational Science

List of References

Unix for Dummies - Quick Reference (IDG Books)

Unix in a Nutshell (O'Reilly)

Linux in a Nutshell (O'Reilly)

Fortran 90/95 Explained, Metcalf & Reid, Oxford Univ Press, 1999

Fortran 90 for Engineers and Scientists, Larry Nyhoff and Sanford Leestma, Prentice-Hall, 1997

Parallel Programming in OpenMP (Chandra et al)

Using MPI (Gropp, Lusk, & Skjellum)

Parallel Programming with MPI (Pacheco)

List of Related Links

Introduction to Using PACMAN Cluster

Introduction to Using Cray Fish Cluster

ARSC HPC Newsletters

List of Fortran Tutorials

Arctic Region Supercomputing Center (ARSC) | PO Box 756020, Fairbanks, AK 99775 | voice: 907 -450-8600 | fax: 907-450-8603
For questions or comments regarding this website, contact **info@arsc.edu**