FORMAT 1

Submit original with signatures + 1 copy + electronic copy to UAF Governance.

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	**Electrical and Computer Eng.**	**College/School**	**CEM**
Prepared by	**Dejan Raskovic**	**Phone**	**474-5256**
Email Contact	**draskovic@alaska.edu**	**Faculty Contact**	**Dejan Raskovic**

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

2. COURSE IDENTIFICATION: Dept **EE** Course # **643** No. of Credits **3**

Justify upper/lower division status & number of credits: **Graduate course, no laboratory, meets two times a week for 1.5 hour**

3. PROPOSED COURSE TITLE: **Selected Topics in Computer Engineering**

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 such signatures.)

5. To be STACKED? *YES/NO* **NO** If yes, Dept. [ ] Course # [ ]

6. FREQUENCY OF OFFERING: **Fall, odd-numbered years**

Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (if approved) **Fall 2011**

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) **lecture**

9. CONTACT HOURS PER WEEK: **3** LECTURE hours/weeks **0** 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/cd/credits.html for more information on number of credits.

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):

EE 643 3 Credits
Selected Topics in Computer Engineering

The course covers massively parallel computer architectures and their application for computationally intensive engineering problems. Fundamental hardware concepts and issues in designing such systems are introduced. Compute Unified Device Architecture (CUDA), developed by NVIDIA for the compute engines in their graphic processing units (GPUs), will be used as an example and a practical platform for student assignments. Through assignments and a project students will learn how to employ extensive parallel processing capabilities of modern GPUs in C and Matlab programs for physical modeling, simulation, computational engineering, convolution, correlation, filtering, and similar problems of particular interest to engineering students. ***Prerequisites: CS201 or ES201; EE443; graduate standing; or permission of the instructor.*** (3+0)

11. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities [ ] S = Social Sciences [ ]

Will this course be used to fulfill a requirement for the baccalaureate core? **YES** [ ] **NO** [ ]

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

O = Oral Intensive, Format 6 [ ] W = Writing Intensive, Format 7 [ ] Natural Science, Format 8 [ ]

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 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.

LETTER: [X] **PASS/FAIL:** [ ]

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES CS201 or ES201; EE443; graduate standing; or permission of the instructor

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

RECOMMENDED EE463 or EE464

Classes, etc. that student is strongly encouraged to complete prior to this course.

15. SPECIAL RESTRICTIONS, CONDITIONS

16. PROPOSED COURSE FEES $

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

17. PREVIOUS HISTORY

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

If yes, give semester, year, course #, etc.: Fall 2007: EE693, Fall 2009: EE693

18. ESTIMATED IMPACT

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

None

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 [ ] Additional reading material will be accessible from instructor's web page

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)

Electrical and Computer Engineering, Computer Science

21. POSITIVE AND NEGATIVE IMPACTS

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

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.

The course has been offered two times as a special topics course. Graduate students in the Electrical and Computer Engineering department are facing the problem of having to take too many (more than allowed) Special Topics (693) courses. Approving Wireless Sensor Networks as a new course will alleviate this problem.

APPROVALS:

Charles E Mayer — Date 9/29/10
Signature, Chair, Program/Department of: ECE

Debasmita Misra — Date 10/7/10
Signature, Chair, College/School Curriculum Council for: CEM

[signature] — Date 10/11/10
Signature, Dean, College/School of: CEM

Date
Signature of Provost (if applicable)

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

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

Date
Signature, Chair, UAF Faculty Senate Curriculum Review Committee

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:

Course syllabus - TENTATIVE

EE 643 – SELECTED TOPICS IN COMPUTER ENGINEERING

COURSE INFORMATION

Instructor: Dr. Dejan Raskovic
Office: Duckering 225
Telephone: 474-5256
Email: draskovic@alaska.edu
Web: go.alaska.edu/draskovic

Lectures: Monday, Wednesday, 17:30 – 19:00, Duckering 210
Office Hours: Monday 15:00 – 17:00, Thursday 11:30 – 12:30

COURSE DESCRIPTION

The course covers massively parallel computer architectures and their application for computationally intensive engineering problems. Fundamental hardware concepts and issues in designing such systems are introduced. Compute Unified Device Architecture (CUDA), developed by NVIDIA for the compute engines in their graphic processing units (GPUs), will be used as an example and a practical platform for student assignments. Through assignments and a project students will learn how to employ extensive parallel processing capabilities of modern GPUs in C and Matlab programs for physical modeling, simulation, computational engineering, convolution, correlation, filtering, and similar problems of particular interest to engineering students. (3+0)

Prerequisites: CS201/ES201; EE443; graduate standing; or permission of the instructor.
Recommended: EE463 or EE464

Textbook: No official textbook will be used. Instead, a selection of research papers and complete documentation for CUDA architecture and applications will be available for download.

References and Background Reading

H. El-Rewini, M. Abd-El-Bar, *Advanced Computer Architecture and Parallel Processing*. Wiley-Interscience 2005.

J.Hennessy, D. Patterson, *Computer Architecture - A Quantitative Approach*, 4th Edition. Elsevier 2007.

Reading material consisting of selected scientific papers, selected pages from other books and component datasheets will be assigned in class and/or posted on Blackboard.

COURSE POLICIES

Grading:

Assignments	30%
Midterm	25%
Project	40%
Participation	5%

Letter grades will be assigned using a standard linear grading scheme 90+ A, 80+ B, etc.
(I may elect to set the grade cutoffs lower, but I will not set them higher.)
Plus/Minus grading will be used – see the UAF catalog for numerical GPA values

Students are strongly encouraged to attend every class and participate in the classroom discussion in a manner that would benefit other students as well. A project topic for each student will be determined jointly by the student and the instructor, after discussing student's background and interests.

Each student is required to establish a reliable email address and to send it to the instructor (draskovic@alaska.edu). This address will be used for class correspondence – announcements, laboratory assignments clarifications, etc. The course Blackboard page will contain useful information and will be updated throughout the course. The students will be notified by email when the content of the page changes.

The current version of this syllabus will be available on the course web page.

TENTATIVE COURSE TOPICS

WEEK	TOPIC
1	Review of main concepts
2	Sources of parallelism; Multiprocessors and thread-level parallelism
3	GPGPU : Introduction
4	GPU architectures and PC host architectures
5,6	GPU Architecture Streaming processing arrays Streaming multiprocessors Device memory Interconnect
7	CUDA programming and memory models
8	CUDA API, tools, optimizations, arithmetic
9, 10	Multiprocessor and multicore interconnection networks; Models of parallel computers;
11	Routing; Bandwidth; Communication costs
12	Performance analysis of multiprocessor architectures
12	Multiprocessor SOC
13	Designing for low power
14	Project presentations

COURSE GOALS AND LEARNING OUTCOMES

The goal of the course is to familiarize students with hardware concepts behind modern massively parallel computing architectures. By the end of the course, the students should be able to fully understand the hardware organization of parallel systems and to apply them in their everyday engineering and scientific problems.

STUDENT SUPPORT SERVICES

CEM computer technicians are located in the Duckering building room 248 (contact phone: 474-6146). They can help you set up a TSS account and use the equipment available in the lab (Duckering 210). If you need help in writing and presenting your project, you can contact the UAF Writing Center (801 Gruening building, phone: 474-5314) and the UAF Speaking Center (507 Gruening building, 474-5470).

DISABILITIES SERVICES

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. The instructor, the teaching assistant, and the administrative assistant will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities.

PLAGIARISM

As a UAF student, you are subject to UAF's Honor Code:

"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.

Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses and other reports. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors.

Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."