

Dutta, Lakshmi

From: Smith, Randy
Sent: Friday, July 21, 2006 2:59 PM
To: 'weide.1@osu.edu'; 'orin@ece.osu.edu'
Cc: Baeslack, Bud; 'Hazel Morrow-Jones'; 'Noe, Raymond'; Dutta, Lakshmi; Smith, Randy; Anderson, Carole (.32); 'slotnick.1@osu.edu'; Myers, Brad (.7); 'dickhaut.1@osu.edu'; 'ozguner.2@osu.edu'; 'zhang.574@osu.edu'
Subject: Graduate Interdisciplinary Specialization

Bruce and David:

Based on a recommendation from the Council on Research and Graduate Studies, the Council on Academic Affairs, at its meeting on July 6, 2006, approved the proposal from the Department of Computer Science and Engineering and the Department of Electrical and Computer Engineering, to establish a **Graduate Interdisciplinary Specialization/Minor in Applied Software Engineering**. Professor Raymond Noe and I, as Chair and Vice Chair of the Council, presented the proposal on your behalf, and Professor Elliot Slotnick, Associate Dean, Graduate School, responded very effectively to questions/comments.

No additional level of review/approval is necessary. This action will be included in the Council's next Annual Activities Report to the University Senate.

Please keep a copy of this message for your file(s) on the proposal and I will do the same for the file in the Office of Academic Affairs.

If you have any questions about this action, please contact me.

Congratulations on the successful completion of the review/approval process.

Randy

W. Randy Smith
Vice Provost



Dean of the Graduate School

250 University Hall
230 North Oval Mall
Columbus, OH 43210-1366

Phone (614) 292-6031
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May 22, 2006

W. Randy Smith
Vice Chair, Council on Academic Affairs
Vice Provost for Curriculum and Institutional Relations
203 Bricker Hall
190 North Oval Mall
Campus

MAY 24 2006

OFFICE OF ACADEMIC AFFAIRS


Dear Randy:

The Council on Research and Graduate Studies approved the following proposals during its meeting on May 17, 2006. Attached please find a copy of the proposals as well as my correspondence with the proposing programs that may assist the Council on Academic Affairs during its review.

- Proposal to reduce the number of credit hours required for the Master of Occupational Therapy program
- Proposal to create a graduate interdisciplinary minor/minor in Applied Software Engineering
- Proposal for a graduate interdisciplinary specialization in "Religions of the Ancient Mediterranean"
- Proposal for a minor in Theatre and Performance
- Proposal for changes to the Master's degree in Communication

Please let me know if you have questions or if you require additional information.

Sincerely,



Elliot E. Slotnick
Associate Dean

Enclosures

c: Irene Mynatt

MAY 24 2006

OFFICE OF ACADEMIC AFFAIRS

Proposal to

Create a Graduate Interdisciplinary
Minor/minor
in Applied Software Engineering

Submitted by

Professor Bruce W. Weide
Department of Computer Science and Engineering

and

Professor David Orin
Department of Electrical and Computer Engineering

Approved by the Council on Research and Graduate Studies
May 17, 2006

To: "Bruce W. Weide" <weide@cse.ohio-state.edu>
From: "Elliot E. Slotnick" <Slotnick.1@osu.edu>
Subject: Re: Applied Software Engineering interdisciplinary specialization
Cc: mynatt.2@osu.edu, jo wittenauer <wittenauer.1@osu.edu>
Bcc:

Hi Bruce,

Yours is a well timed query--since the Curriculum Committee discussed the proposal yesterday and a note to you is on my "list" for today.

The bottom line is that you're virtually there but not quite. First, please alter the title page with an asterisk in which you indicate that for ECE students this will be called a "Graduate Interdisciplinary Minor" and that CSE students following this curriculum will not obtain a transcript designation--as per your subsequent Footnote 1. The other outstanding items are some letters of concurrence. We'll need one from Bud Baeslack (or the appropriate Associate Dean in his office--I think that's hazel Morrow-Jones) as well as the two relevant GSC Chairs. (Gagan Agrawal and Rob Lee).

It would be terrific if we could get that back by our next Committee meeting (May 23rd)--but even if you can't make that date, we should be able to have everything in hand and in order in tome for our last Research and Graduate Council meeting on June 7th. If we can clear you through then, CAA should be able to concur with review over the summer--they meet then, we don't.

On the fiscal side, the money was authorized for the development of the program and should not be contingent on approval. Sometimes the money is needed to do the very things necessary to be approved--and in several instances, money was authorized to 'seed" a proposal with no assurance that the proposal would ever come to fruition. I see no reason why the money cannot be released if it is needed prior to the specialization's approval. On that score, if the money is needed now, you (and /or your Fiscal Officer) should be in touch with Jo Wittenauer in our office.

Best,
elliot

Hi Elliot,

We were wondering if you can give us a status report on our proposal for an Applied Software Engineering interdisciplinary specialization. There are two things we're interested in doing now and this summer that depend upon approval of the proposal, so it would be helpful for planning purposes

to
have some idea of when a decision will be made on the proposal.
Specifically, (1) we would like to start advertising the ASE
specialization
as soon as possible because the sequence of courses is best started in
the
fall quarter; and (2) we have already-approved funding from the Grad
School
(a proposal dating to Sp05) that will support some course development
activities related to this program, and that is contingent upon program
approval before the funds are released to us.

Thanks for any info you can provide about the likely timeframe for a
decision.

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Cheers,
Bruce

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Elliot E. Slotnick
Associate Dean
The Graduate School
The Ohio State University
250 University Hall
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18 April 2006

Dr. Elliot Slotnick
Graduate School
250 University Hall
230 North Oval Mall
CAMPUS

Dear Elliot:

On behalf of the Computer Science and Engineering Department and the Electrical and Computer Engineering Department, I am pleased to submit the enclosed proposal for a graduate interdisciplinary specialization in Applied Software Engineering. Despite the time it has taken us to formulate this program, we look forward to a relatively painless and quick approval process! Please let me know if you need any further information, copies, etc.

Sincerely,

Bruce W. Weide
Professor and Associate Chair
2-1517
weide.1@osu.edu

cc: David Orin, ECE



**Department of
Electrical and Computer Engineering**

205 Drees Laboratory
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Phone 614-292-2572
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April 3, 2006

Council on Research and Graduate Studies
Graduate School
250 and 247 University Hall
230 N. Oval Mall
Columbus, OH 43210-1366

To the Council on Research and Graduate Studies:

This letter is in support of our joint proposal with the Department of Computer Science and Engineering (CSE) to offer a Graduate Interdisciplinary Specialization in Applied Software Engineering (ASE).

The Computer Systems area of our Curriculum Committee has developed the proposal for the ASE Graduate Interdisciplinary Specialization with CSE. The ECE Graduate Studies Committee (Robert Lee, Chair) has reviewed the proposal and has approved the offering.

Profs. Bruce Weide of CSE and David Orin of ECE are the primary contacts for the proposed program. Please let us know if we can provide any further information to you.

Sincerely yours,

Fusun Ozguner
Interim Chair

cc: Robert Lee, Chair, ECE Graduate Studies Committee
David Orin, Chair, Computer Systems area, ECE Curriculum Committee

Note: Original sent directly
to Graduate School.



Office of the Dean
College of Engineering

142A Hitchcock Hall
2070 Neil Avenue
Columbus, OH 43210
Phone 614-292-2836
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April 13, 2006

Carole Anderson
Vice Provost and Interim Dean
Graduate School
North Oval Mall
CAMPUS

Dear Dean Anderson:

I am writing in support of the interdisciplinary graduate specialization in Applied Software Engineering proposed by Computer Science and Engineering Department and Electrical and Computer Engineering Department.

The proposed interdisciplinary specialization will provide an important service to graduate programs in the sciences and engineering without requiring much in the way of additional resources. The two programs have developed a rigorous and useful curriculum, have plans for advertising the specialization, are prepared for a range of enrollments and have developed the necessary administrative framework to operate the specialization.

The College of Engineering supports the proposal and would appreciate the Graduate School's approval of it.

Thank you for your help.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. A. Baeslack III'.

W. A. "Bud" Baeslack III
Dean, College of Engineering



Office of the Chairperson
Department of Computer
Science and Engineering

2015 Neil Avenue
Columbus, OH 43210-1277
Phone 614-292-5973
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www.cse.ohio-state.edu

March 16, 2006

To: Elliot Slotnick, Associate Dean, Graduate School

From: Xiaodong Zhang, Chairperson, Computer Science & Engineering

Subj: New graduate interdisciplinary minor

The CSE faculty have endorsed this proposal, and as chair I fully support our joint offering with ECE of a new graduate interdisciplinary minor in Applied Software Engineering.

Proposal for a Graduate Interdisciplinary Specialization in *Applied Software Engineering**

Revised 10 May 2006 (per Elliot Slotnick)

Primary Contact Information

Prof. Bruce W. Weide
Department of Computer Science and Engineering
Dreese Lab 395
2015 Neil Ave.
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Background and Rationale

Computing has become the key enabler of fabulously rapid advances that have occurred—and that will continue for the foreseeable future—across nearly all disciplines of the academy and throughout all segments of society. Most graduate students in these disciplines are comfortable using shrink-wrapped software on PCs. They already can deal with computing as a commodity, i.e., as general-purpose “information technology”. However, this capability is not enough for all graduate students. In order to conduct state-of-the-art research in many disciplines, especially in engineering and science, some students must design and develop sophisticated discipline-specific software. Unfortunately, few students in non-computing majors are formally educated or trained in the systematic design and development of software systems. This is a prescription for trouble: such students can waste a tremendous amount of time and energy trying to build custom software; the software they develop may not work correctly, jeopardizing research findings, future funding, etc.; and/or the software they develop may turn out to be incomprehensible to their successors (and advisors) and therefore useless after they graduate.

Moreover, many engineering and science graduate students—not just those majoring in computing but often those with traditional engineering and science degrees—ultimately find employment with high-tech companies in jobs where they are expected to help design and develop technical software. Many forward-looking companies now recognize that problems loom on the horizon if critical software systems are developed by well-meaning but under-educated employees who know little about systematic software design and development. Eventually these systems require enhancement, extension, integration with other systems, porting to new platforms, performance tuning, etc., at which point “the chickens come home to roost”. Many companies find themselves having to provide significant on-the-job training to new employees in the use of industry-standard software engineering technologies and tools that could just as well be taught to students in universities without fear of making graduates too narrow or specialized. Prospective employees who already have the knowledge and skills to develop sophisticated technical software systems are therefore very attractive to these employers.

Filling this educational gap is the goal of the proposed program: a *graduate interdisciplinary specialization in Applied Software Engineering (ASE)*. We began work five years ago on the “ASE

* According to Graduate School rules, graduate students majoring in CSE and ECE may not take the ASE program as a “graduate interdisciplinary specialization”. CSE graduate students may take courses in the ASE program, but even completion of the program will not be noted in any special way on their transcripts. However, ECE graduate students may take the ASE program as a “graduate interdisciplinary minor” if they complete at least 14 cr-hrs of the coursework in CSE courses, including cross-listed courses taken under CSE course numbers.

course sequence”, as it has been known, with substantial seed funding from Lucent Technologies. Our departments’ tradition to pilot each course twice before making it permanent, combined with the demands of continually modifying course content to keep pace with rapid technological changes, have brought us to the current situation and to this proposal.

Target Student Population

The primary audience for the ASE program will be graduate students in traditional engineering and science disciplines. We anticipate that many students in the ASE program will be majors in engineering fields. Based on the ASE course sequence experience, where our advertising has been confined primarily to Engineering, we expect these students to come mostly from Electrical and Computer Engineering, Mechanical Engineering, Industrial and Systems Engineering, and Biomedical Engineering. We also expect the ASE program to interest students from Mathematics, Physics, Biology, Chemistry, Molecular Genetics, etc. There are many fields where custom software is becoming indispensable to state-of-the-art research, and where graduate students doing that research may be expected to help design and develop discipline-specific application software. We will therefore advertise the ASE program and make it academically accessible to interested graduate students throughout the university with relatively modest prerequisites: some calculus and some prior programming experience. Engineering and science graduate students are nearly certain to have the required background, and many students from other disciplines where the ASE program would be useful (e.g., Economics) will have it as well.

Proposed Curriculum

The main intended learning outcome of the ASE program curriculum is for students to be able to use industry-standard state-of-the-practice software technologies and tools, and thereby to be immediately productive in designing and developing software systems for use in their research, and/or as employees in high-tech industry positions involving technical software development. The proposed curriculum to achieve this will total 15 cr-hrs, as follows:

CSE 502 (3 cr-hrs)
CSE/ECE 768 (3 cr-hrs)
One of CSE/ECE 767 or CSE/ECE 794R (3 cr-hrs) (the other may be chosen as an elective)
Two electives; recommended: CSE 541, CSE 551, CSE 621, CSE 630, CSE 670, CSE 680, ECE 694Z, ECE 753.02 (3 cr-hrs each)

The first course course, CSE 502, has largely traditional content. It is required to get engineering and science students with non-computing backgrounds “up to speed”. It focuses on standard introductory object-oriented concepts and programming language features that are routinely taught to undergraduate computing majors. Students who have this background already may skip this course and replace it with an extra elective, as explained below.

The next three courses, CSE/ECE 768, CSE/ECE 767, and CSE/ECE 794R, teach specific software engineering processes based on modern industry-standard technologies such as UML; iterative and incremental development; use-case analysis; component-based software engineering; Java technologies including Java Beans, reflection, and class loading; C# and .NET technologies from Microsoft; and distributed systems based on standards such as EJB, JSP, XML, SOAP Web Services, WS-* specifications, Indigo, etc. The choice of either CSE/ECE 767 or CSE/ECE 794R is not because of overlap in content, but because these courses are offered every other year, and we wish to make it possible for a student to complete the ASE program in one year if so desired. A student may take both of these courses if time permits, the second one then counting as an elective.

The student may select the final two courses in the ASE program from a list of graduate-level CSE and ECE course offerings that are most relevant, in consultation with the ASE Program Advisors (see

Administration below). We recommend a set of electives involving specific technologies of wide applicability in engineering and science: artificial intelligence, data structures and algorithms, databases, high-performance computing, information security, numerical methods, and real-time and embedded computing. Some students may begin the ASE program with a background that enables them to skip CSE 502; these students will select three elective courses. Some students also may have backgrounds that enable them to take a number of other CSE graduate courses, any of which may be appropriate electives. However, the courses below are listed explicitly because they are *intended* to be accessible to graduate students outside CSE.

Some undergraduate and graduate students in CSE and ECE also take most of the required and elective courses. The required courses for the ASE program are more applied and technology-oriented than the generally theoretical course requirements for computing majors, and serve as a nice complement to them for many majors. Students who are majoring in computing therefore will join students in the ASE graduate interdisciplinary specialization in these classes. This provides opportunities for interesting interdisciplinary team projects and facilitates interactions that can lead to subsequent intellectual collaboration.

We are in the process of making slight prerequisite changes in four of the elective courses (CSE 541, CSE 630, CSE 670, and CSE 680) to make it clear that they are appropriate for ASE program students who have completed the required CSE 502 or CSE/ECE 768 (to be renumbered to 668). The other courses listed require no such changes. The consequences of all planned changes to course bulletin information, in support of the ASE program, are shown by ~~strike-through~~ (deletions) and underlining (additions).

Primary ASE courses:

CSE 502: Object-Oriented Programming for Engineers and Scientists (UG3)

Introduction to object-oriented programming for experienced procedural programmers, with applications from engineering and science; interfaces, classes, packages; implements and extends relationships; design patterns.

Au Qtr. 3 cl. Prereq: Math 152 or equiv; En Graph 167 or CSE 202 or equiv; additional programming experience.

CSE/ECE ~~768~~ 668: Applied Component-Oriented Programming for Engineers and Scientists (UG3)

Application of component-based software engineering technology to design and implementation of ~~electronics simulation~~ software systems in engineering and science.

Wi Qtr. 3 cl. Prereq: ~~CSE 694J or~~ CSE 502 or CSE 560 or equiv; ~~ECE 205 or ECE 300 or equiv.~~

CSE/ECE 767: Applied Use-Case-Driven Object-Oriented Analysis and Design for Engineers and Scientists (UG3)

Case study using an incremental and iterative use-case-driven process for building object-oriented scientific and engineering software systems; analysis, design, UML modeling, design patterns.

Sp Qtr (odd years only). 3 cl. Prereq: CSE ~~768~~ 668

CSE/ECE 794R: Applied Enterprise Distributed Computing for Engineers and Scientists (UG3)

Technologies and middleware for distributed computing, in particular sockets, remote class loading, Java RMI, JSP, Servlets, Jini, XML, SOAP Web Services, WS-* specifications and Indigo.

Sp Qtr (even years only). 3 cl. Prereq: CSE ~~768~~ 668

Recommended elective courses:

CSE 541: Elementary Numerical Methods (UG3)

Survey of basic numerical methods; number systems and errors of finite representation, solution of a single non-linear equation, interpolation, numerical integration, and solution of linear systems.

Su, Au, Wi, Sp Qtrs. 3 cl. Prereq: CSE 221/H221 or CSE 230 or CSE 502; Math 153.

CSE 551: Introduction to Information Security (UG3)

Introduction to security of digital information including: threats, regulations, risk management, attack detection and response, cryptography, forensics, and technical training and certification.

Wi Qtr. 3 cl. Prereq: CSE 314 or CSE 321 or CSE 502 or AMIS 531 or equivalent, and second writing course; or permission of instructor.

CSE 621 Introduction to High-Performance Computing (UG3)

High-performance computer architecture, scientific/engineering computation, development of parallel programs, parallelization overheads; performance evaluation.

Au Qtr. 3 cl. Prereq: CSE 541; Math 568 or Math 571 or Math 601. Course is well suited to grad students from science/engineering in addition to CSE students.

CSE 630: Survey of Artificial Intelligence I: Basic Techniques (UG3)

A survey of the basic concepts and techniques, problem solving, and knowledge representation, including an introduction to expert systems.

Au, Wi, Sp Qtrs. 3 cl. Prereq: CSE 222/H222 or CSE 502, and Math 366.

CSE 670: Introduction to Database Systems I (UG3)

Database systems use; query languages-SQL and relational algebra; logical database design; entity-relationship model, database normalization; introduction to transaction processing; database design project.

Au, Wi, Sp Qtrs. 3 cl. Prereq: CSE 314 or CSE 321 or CSE 502 and Math 366, or grad standing.

CSE 680: Introduction to Analysis of Algorithms and Data Structures (UG3)

Performance analysis considerations in design of algorithms and data structures; asymptotic analysis, recurrence relations, probabilistic analysis, divide and conquer; searching, sorting, and graph processing algorithms.

Au, Wi, Sp Qtrs. 3 cl. Prereq: CSE 560 or CSE/ECE 668; Stat 427; and Math 366.

ECE 694Z: Real-time and Embedded System Design Technologies (UG3)

Theory essential for advanced research in real-time area and practical ability to design and implement real-time/embedded systems.

Sp Qtr. 3 cl. Prereq: ECE 662 or CSE 675.01.

ECE 753.02: Autonomy in Vehicles (UG3)

Autonomy in the context of modern vehicles; cruise control, anti-lock brake systems (ABS), steering control/lane keeping; introduction to automated highway systems (AHS).

Wi Qtr (even years only). 3 cl. Prereq: ECE 551 or grad standing.

Administration

The ASE program will be administered jointly by CSE and ECE. Administrative overhead will be kept to a minimum, as follows:

1. We will advertise the ASE program on the CSE and ECE Department web sites, and will seek to have it advertised on the College of Engineering web site. We may do other advertising through personal contact with faculty in other departments.
2. We will explain the ASE program to students in each of the required courses of the program.
3. We will provide a simple form, used to document completion of the ASE program, to every interested student in each of the required courses of the program.
4. We will designate an ASE Graduate Interdisciplinary Specialization Advisor from each of the CSE and ECE Departments who will be responsible for discussing choices of elective courses, and for checking and then signing the form to certify completion of the “graduate interdisciplinary specialization/minor in Applied Software Engineering”. The student may choose either of these Advisors to sign the form. At this point, it will be the student’s responsibility to take the form to the Graduate School to be processed like any other graduate interdisciplinary specialization/minor.

If it is deemed advisable by some administrative entity involved in approval of this proposal, we will ask students to “apply” to ASE program and keep track of which students claim to be in it. However, if this is not required, then we do not plan to track students until they have completed coursework for the program and have had this certified by one of the ASE Graduate Interdisciplinary Specialization Advisors.

Prospective Enrollment

Until the idea of graduate interdisciplinary specializations becomes well known and embraced across OSU, we expect we would attract perhaps 10 students per year to the ASE program. Since most of the courses involved also are taken by some CSE and ECE students, there should be sufficient demand to allow all the required courses to be offered as scheduled; internal demand dictates that there are already multiple sections per year of some of the elective courses in the curriculum. But in the event that any of the required courses is not offered in a given year (e.g., because of low demand), suitable alternatives will be offered to all students in the program. Demand for the ASE program could increase once the idea of a graduate interdisciplinary specialization becomes widely accepted, or perhaps required, for some Ph.D. degrees at OSU. We expect to be able to handle as many as 20 students per year in this program, as this would not result in increasing the numbers of sections of any of the required courses. If demand exceeds this, which we consider unlikely, then we would make every effort to accommodate all interested students.

Department Chairs’ and Dean’s Letter of Support

Attached to original submission.