Overview of Proposed Changes to CISE MS programs

The Computer and Information Science and Engineering department is requesting approval of three simultaneous changes to our Masters level degree programs. In order to provide context, all three changes are described in this document.

1. Establishment of a new major code CSE to allow an MS in Computer Science (CIP code 11.0101) to be offered by CISE through the College of Engineering.
2. Modification of the curriculum of the existing MS in Computer Science offered by CISE through the College of Liberal Arts and Sciences.
3. Modification of the curriculum of the existing MS in Computer Engineering offered by CISE.

Rationale

Current Degree Programs
Figure 1 illustrates the Computer Science and Computer Engineering programs offered by CISE. Currently, students studying at the MS level have the choice between an MS in Computer Engineering (CIP code 14.0901) offered through the College of Engineering and an MS in Computer Science (CIP code 11.0101) with the same requirements offered through the College of Liberal Arts and Sciences. CISE also offers the MS in Digital Arts and Sciences. However, as this program has its own identity and emphasis, no changes in the DAS MS are requested in this proposal.

Although there is significant overlap between the fields of Computer Science and Computer Engineering, the current situation is confusing to students and other stakeholders. In the past, the choice between programs was constrained by certain idiosyncrasies of funding opportunities for out-of-state students causing the vast majority of students to choose Computer Engineering even though their course of study would be more accurately labeled Computer Science.
Proposed Degree Programs
The changes in this proposal will both fill the gap in our programs in the College of Engineering and differentiate between them. CISE will offer three MS degrees in Computer Science and Computer Engineering, plus the MS in Digital Arts and Sciences.

<table>
<thead>
<tr>
<th>Degree Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS in Computer Science through Engineering</td>
<td>standard CS degree</td>
</tr>
<tr>
<td>MS Computer Science through Liberal Arts and Sciences</td>
<td>explicitly interdisciplinary program with new interdisciplinary specializations</td>
</tr>
<tr>
<td>MS in Computer Engineering</td>
<td>oriented towards computer architecture, networking, and other typical Computer Engineering areas</td>
</tr>
</tbody>
</table>

The new CS major is intended to be standard MS in Computer Science to be offered through the College of Engineering. Concurrently with this proposal, we are proposing a new PhD in Computer Science to be offered through the College of Engineering. Once both programs are in place, CISE will offer degrees in Computer Science through the College of Engineering at the BS (existing), MS, and PhD levels. The new structure is shown in Figure 2.
Comparison

The requirements for each program are summarized below. All programs require a total of 30 credits. Students must satisfy the core requirements for their chosen degree along with requirements for either the thesis or non-thesis option.
# Proposed Core Requirements

<table>
<thead>
<tr>
<th>CS CLAS (9)</th>
<th>CS Engineering (12)</th>
<th>Comp Eng (12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 from 5:</td>
<td>2 from 4:</td>
<td>2 from 3:</td>
</tr>
<tr>
<td>• COT 5615 Mathematics for Intelligent Systems</td>
<td>• CDA 5155 Computer Architecture Principles</td>
<td>• CNT 5106C Computer Networks</td>
</tr>
<tr>
<td>• COT 6315 Formal Languages and Computation Theory</td>
<td>• COP 5615 Distributed Operating System Principles</td>
<td>• COP 5615 Distributed Operating System Principles</td>
</tr>
<tr>
<td>• CNT 5106C Computer Networks</td>
<td>• CNT 5106C Computer Networks</td>
<td>• CDA 5636 Embedded Systems</td>
</tr>
<tr>
<td>• COP 5536 Advanced Data Structures</td>
<td>• COP 5536 Advanced Data Structures</td>
<td></td>
</tr>
<tr>
<td>• COP 5555 Programming Language Principles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# Other Requirements (non-thesis)

<table>
<thead>
<tr>
<th>CS CLAS (21)</th>
<th>CS Engineering (18)</th>
<th>Comp Eng (18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 graduate-level credits:</td>
<td>18 graduate-level credits:</td>
<td>18 graduate-level credits:</td>
</tr>
<tr>
<td>• At least 9 CISE</td>
<td>• At least 12 CISE</td>
<td>• At least 9 CISE</td>
</tr>
<tr>
<td>• At least 9 non-CISE, with at least 3 CLAS</td>
<td>• Max 6 non-CISE with approval</td>
<td>• Max 9 ECE or other non-CISE courses with approval</td>
</tr>
<tr>
<td>• The student's program must form a coherent specialization which must be approved by the Graduate Affairs Committee.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Credits total</td>
<td>30 Credits total</td>
<td>30 Credits total</td>
</tr>
</tbody>
</table>
## Other Requirements (thesis)

<table>
<thead>
<tr>
<th>CS CLAS (21)</th>
<th>CS Engineering (18)</th>
<th>Comp Eng (18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 graduate-level credits:</td>
<td>18 graduate-level credits:</td>
<td>18 graduate-level credits:</td>
</tr>
<tr>
<td>- At least 6 CISE non-research</td>
<td>- At least 9 CISE non-research</td>
<td>- At least 6 CISE</td>
</tr>
<tr>
<td>- At least 6 non-CISE, with at least 3 CLAS</td>
<td>- Max 6 non-CISE with approval</td>
<td>- Max 9 ECE or other non-CISE courses with approval</td>
</tr>
<tr>
<td>- 6 CIS 6971 MS research</td>
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</tr>
<tr>
<td><strong>The student's program must form a coherent specialization which must be approved by the Graduate Affairs Committee.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 30 Credits total | 30 Credits total | 30 Credits total |
Changes to MS Computer Science - CLAS

This document requests approval of changes to the MS in Computer Science offered by the Department of Computer and Information Science and Engineering through the College of Liberal Arts and Sciences.

Under this proposal, the MS in Computer Science through CLAS will become explicitly interdisciplinary. The required core courses have been changed and students will have more flexibility to take courses outside of CISE. The total number of credits remains 30. Once the new requirements have been approved, we plan to develop preapproved interdisciplinary specializations will meet the requirement that "The student’s program must form a coherent specialization which must be approved by the CISE Graduate Affairs Committee."

This curriculum change is being requested simultaneously with proposed changes to the MS in Computer Engineering and a request for a new major code to offer a MS in Computer Science through the College of Engineering.

This document contains old and new requirements as they appear on our department web page followed by a marked up version of the description from the graduate catalog. For clarity, pending changes to other graduate degree programs offered by the College of Engineering have not been included in the marked up document. These are described along with additional context and background in the attached document.
Current requirements for MS in CS through CLAS

Required core courses:
- COT 5405 Analysis of Algorithms

Three from the following five courses
- CDA 5155 Computer Architecture Principles
- COP 5555 Programming Language Principles
- COP 5615 Distributed Operating System Principles
- CNT 5106C Computer Networks
- COP 5536 Advanced Data Structures

Course and Credit Requirement for Thesis Option:
- 12 CISE graduate core credits
- 6 master thesis research credits (CIS 6971)
- 12 other CISE graduate-level credits:
  - Minimum of 6 credits MUST be taken from CISE graduate-level courses.
  - Up to 1 credit of CIS 6935 (Graduate Seminar) allowed.
  - Up to 3 credits of CIS 6905 (Individual Study) allowed.
  - EXCLUDES CIS 6910, CIS 6940.
  - Maximum 6 credits outside the department MAY be taken with approval from the Graduate Affairs Committee.
    - Up to 3 credits of EGN5949 (internship) allowed.

Course and Credit Requirement for Non-Thesis Option:
- 12 CISE graduate core credits.
- 18 other CISE graduate-level credits:
  - Minimum of 12 credits MUST be taken from CISE graduate-level courses.
    - Up to 1 credit of CIS 6935 (Graduate Seminar) allowed.
    - Up to 3 credits of CIS 6905 (Individual Study) allowed.
    - EXCLUDES CIS 6910, CIS 6940.
  - Maximum 6 credits outside the department MAY be taken with approval from the Graduate Affairs Committee.
    - Up to 3 credits of EGN5949 (internship) allowed.
Proposed Requirements for MS in CS through CLAS

Required core courses:
- COT 5405 Analysis of Algorithms

Two from the following five courses
- COT 5616 Mathematics for Intelligent Systems
- COT 6315 Formal Languages and Computation Theory
- CNT 5106C Computer Networks
- COP5536 Advanced Data Structures
- COP5555 Programming Language Principles

Course and Credit Requirement for Thesis Option:
- 9 CISE graduate core credits
- 6 master thesis research credits (CIS 6971)
- at least 15 other graduate-level credits:
  - Minimum of 6 credits MUST be taken from CISE graduate-level courses.
    - Up to 1 credit of CIS 6935 (Graduate Seminar) allowed.
    - Up to 3 credits of CIS 6905 (Individual Study) allowed.
    - EXCLUDES CIS 6910, CIS 6940.
  - Minimum 6 credits outside the department
    - At least 3 of these credits must be offered by the College of Liberal Arts and Sciences
    - Up to 3 credits of EGN5949 (internship) allowed.
- The student’s program must form a coherent specialization which must be approved by the CISE Graduate Affairs Committee.

Course and Credit Requirement for Non-Thesis Option:
- 9 CISE graduate core credits.
- 21 other CISE graduate-level credits:
  - Minimum of 9 credits must be taken from CISE graduate-level courses.
    - Up to 1 credit of CIS 6935 (Graduate Seminar) allowed.
    - Up to 3 credits of CIS 6905 (Individual Study) allowed.
    - EXCLUDES CIS 6910, CIS 6940.
  - Minimum of 9 credits outside the department
    - At least 3 of these credits must be offered through the College of Liberal Arts and Sciences
    - Up to 3 credits of EGN5949 (internship) allowed.
- The student’s program must form a coherent specialization which must be approved by the CISE Graduate Affairs Committee.
Marked up Graduate Catalog Description

The Department of Computer and Information Science and Engineering is concerned with the theory, design, development, and application of computer systems and information processing techniques. The mission of the CISE Department is to educate undergraduate and graduate majors as well as the broader campus community in the fundamental concepts of the computing discipline, to create and disseminate computing knowledge and technology, and to use our expertise in computing to help society solve problems.

The Department of Computer and Information Science and Engineering (CISE) offers

- Master of Science and Ph.D. degrees in computer science through the College of Engineering
- Master of Science degree in computer science through the College of Liberal Arts and Sciences.
- Master of Engineering, Master of Science, Engineer, and Ph.D. degrees in computer engineering through the College of Engineering
- Master of Science degree in digital arts and sciences through the College of Engineering
- Master of Science degree in computer science through the College of Liberal Arts and Sciences.

The CISE Department has six broad areas of specialization:

- **Computer systems**: computer architecture, distributed systems, networks and communication, operating systems, performance evaluation, security, mobile computing, software engineering, programming languages, multimedia systems, and web technologies
- **Database and information systems**: database management systems, database design, database theory and implementation, data mining, database machines, parallel and distributed databases, digital libraries, E-services and commerce, medical, and bio-informatics
- **High-performance computing/applied algorithms**: design and analysis of algorithms, data structures, parallel and distributed computing, medical algorithms, numerical methods, computational complexity, and applied computational geometry
- **Computer graphics, modeling, and art**: modeling methodology, simulation, virtual reality, aesthetic computing, computer arts, animation, real-time rendering, medical modeling, digital media, and musical acoustics
- **Intelligent systems and computer vision**: artificial intelligence, machine learning, visualization, image analysis and processing, pattern recognition, signal processing, biomedical imaging, and image databases
- **Computer networks and security**: wired and wireless networks, network routing and protocols, and QoS.

Applications for admission must be approved by both the Department and the college in which the student wishes to enroll. Applicants should have a strong computer science background.

**Comment [bas1]**: Proposals for these degrees are pending at the Graduate Council. Requirements are NOT included in this document.

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All master's students **Students pursuing an MS in Computer Science through the College of Liberal Arts and Sciences** must satisfy a core requirement by completing **four** specified graduate-level core courses (12-15 credits) or their approved equivalents with no more than one of the core courses receiving a letter grade below "B." Students can select a thesis or nonthesis option for the master's degree. **Digital Arts and**
Sciences students must choose either thesis or project in lieu of thesis. All options require a minimum of 30 credit hours. The thesis degree requires:

- An additional 12-15 credits of course work beyond the core (a minimum of 6 graduate-level credits in CISE and with approval, at most, a minimum of 6 credits in some other department, at least 3 of these must be offered by the College of Liberal Arts and Sciences), and a written thesis.
- A minimum of 6 credit hours must be taken in CIS 6971.

The non-thesis option requires:

- An additional 12-21 credits of letter-graded graduate level course work in CISE beyond the core (a minimum of 9 credits in CISE and a minimum of 9 credits in some other department, at least 3 of these must be offered by the College of Liberal Arts and Sciences).
- 6 letter-graded credits from either CISE or (with approval) from some other department.
- Each nonthesis master’s student is required to pass a comprehensive examination.

The Digital Arts and Sciences project in lieu of thesis option requires 6 credit hours of project/performance credits.

To demonstrate breadth and proficiency, all Ph.D. students must take 4 required core courses obtaining a 3.4 GPA in 3 of the 4 required core courses, with no more than one of the core courses receiving a letter grade below B, to be eligible to take the Ph.D. qualifying examinations.

Ph.D. students are required to take a minimum of 90 credit hours. Of these, at least 36 hours must be graduate-level CISE course work excluding individual study and research credits. A minimum of 3 hours must be taken in CIS 7980. A maximum of 30 credits may be awarded toward the Ph.D. degree from an appropriate master’s degree.

The Database Systems Research and Development Center, the Software Engineering Research Center, the Center for Computer Vision and Visualization Center, and a number of other campus research centers provide opportunities for students enrolled in the program.

The department offers a combined bachelor’s/master’s degree program. Contact the Department’s Student Services Center for information.
November 5, 2013

Dr. Cammy R. Abernathy, Dean
College of Engineering Dean's Office
University of Florida
300 Weil Hall
P.O. Box 116550
Gainesville, FL 32611-6550

Dear Dr. Abernathy,

I'm writing to you on behalf of the Department of Computer and Information Science and Engineering Industry Advisory Board (IAB). The Industrial Advisory Board of the Department of Computer and Information Science and Engineering is a standing body consisting of representatives from companies who regularly recruit CISE graduates. The IAB provides regular feedback to the department to ensure that these students are well-qualified for the workplace.

The IAB strongly supports the establishment of a new MS in Computer Science in the College of Engineering. Together with the proposed changes in the existing MS degrees offered by the department (MS in CS in the College of Liberal Arts and Sciences, and MS in Computer Engineering), CISE will be well-positioned at the MS level to adapt to the needs of the local and national economies for advanced workers in diverse and evolving specializations in Computer Science and Engineering.

Sincerely,

Rhonda Holt, CISE IAB Chairperson

cc IAB Members:
Avery Zercoe, East Coast, US Field Manager, US & Canada Operations, Exxon-Mobil

Josh Greenberg, Chief Technology Officer, Grooveshark

Nathan Helmick, Harris

James Gadsby, Sr. Manager Information Technology, Home Depot

Nick Shanks, Vice President Technology, Infinite Energy

Michael Parrish, Enterprise Engineering Director, Lockheed Martin

Ramesh Balasubramanian, Senior Development Lead, Microsoft

John DePaul, Head of Delivery, Mindtree LTD

Greg Miller, Director of Engineering Talent, Ultimate Software

Brett Livengood, Chief of Staff, CIO Office, Sears Holdings

Mike Fabiano, Talent Acquisition Specialist, Mobiquity

Sarah Goodwin, Training Coordinator, Mobiquity