REQUEST FOR ADDITION OF NEW COURSE

Department: Computer Science & Engineering  College: Engineering
Date: November 17, 2017

PROPOSED COURSE DESCRIPTION

Rubric & No. CSC 7598  Title: Distributed Computing

Short Title (≤ 19 characters) DISTRIBUTE DCOMPTING
Semester Hours of Credit 3

If combination course type, # hrs. of
CREDIT for Lecture: ______  Lab/Sem/Rec: ______
Repeat Credit Max. (if repeatable): ______ credit hours  Graduate Credit? Yes  No
Credit will not be given for this course and:
Course Type (Indicate CONTACT hours in the appropriate course type.)
Lecture 3  Lab ______  Seminar ______  Recitation ______  Lec/Rec ______  Lec/Sem ______  Lec/Lab ______  Res/Ind ______  Clin/Pract ______  Intern ______

Maximum enrollment per section: (use integer, e.g. 25 not 20-30) 40
Grading System: Letter Grade X  Pass/Fail ______  Final Exam:** Yes  No

**(Attach justification if the proposed course will not hold a final exam during examination week.)**

Course Description:
(Concise catalog statement exactly as you wish it to appear in the General Catalog)

CSC 7598 Distributed Computing (3)
See EE 7798

BUDGET IMPACT (IF ANSWER TO ANY QUESTION IS "YES", ATTACH EXPLANATION.
If this course is approved, will additional staff be needed? Yes  No X
Will additional space, equipment, special library materials or other major expense be involved? Yes  No X

Academic Affairs Approval: (Date)

ATTACHMENTS (ATTACH THE FOLLOWING TO YOUR PROPOSAL)
JUSTIFICATION: Justification must explain why this course is needed and how it fits into the curricula. Will the course duplicate other courses?
SYLLABUS: Including 14 week outline of the subject matter; titles of text, lab manual, and/or required readings; grading scale and criteria
(For 4000-level, specify graduate student grading criteria if requirements differ for graduate and undergraduate students).

APPROVALS
Department Faculty Approval Date October 27, 2017 College Faculty Approval Date 3/19/18
Department Chair Signature (date) 
Graduate Dean Signature 3/15/18

Coretta Douglas douglas@csc.lsu.edu  College Contact  E-mail

RECEIVED
Academic Affairs Approval (date)

THE GRADUATE SCHOOL
L A S T A T E U N I V E R S I T Y
Course Justification

A distributed computing system is a set of relatively independent, computing nodes that collectively solve a problem. This encompasses environments ranging from a multicore system on a chip to wide area networks connecting computers over large distances. Such systems are finding increasing use in many modern applications including in cloud computing, distributed databases, the smart grid, autonomous robot swarms, and the Internet-of-Things. However, factors like asynchrony and local knowledge that come with a system consisting of many independent processing elements make distributed computing quite challenging. The possibility of failure of some processing elements in the system and the presence of malicious nodes further complicates the task.

This course will study these issues in distributed computing through models, algorithms and bounds, with an emphasis on fundamental problems. It will lay the foundation for working with many modern and future applications in which a proliferation of computing elements makes a distributed environment (rather than one with a centralized control) more feasible.

Since Fall 2012, this course has been offered three times in the current form with an average enrollment of 9 per offering.
EE 7798 / CSC 7598: Distributed Computing

Catalog Data

EE 7798 / CSC 7598 Distributed Computing (3) Prereq: CSC 3102 or equivalent. Distributed computing models, algorithms and applications.

Prerequisite by Topic

Sequential algorithms and their analysis; discrete structures.

Course Objectives and Learning Outcomes

The course will introduce models of distributed computing, develop algorithms for these models and analyze their performance. Fundamental problems will be emphasized. Students will be able to use the algorithms taught in the course as building blocks for solutions to more complex applications. Students will be exposed to current research topics in the area.

Text and Additional Reading


4. Papers from current literature

14-Week Course Outline

1. Distributed System Models: Synchronous and Asynchronous. Message-Passing and Shared Memory (1 week)

2. Basic Algorithms: Spanning Tree, Broadcast, Convergecast, Wave Algorithms (2 weeks)

3. Causality and Synchronization: Logical and Vector Clocks, Snapshots, Clock Synchronization (2 weeks)


5. Fault-Tolerant Consensus: Crash Failures, Byzantine Failures (2 weeks)

6. Applications: Broadcast and Multicast, Distributed Shared Memory, Synchronizers (3 weeks)

7. Topics from Current Literature: For example, autonomous mobile robots, transactional memory, programmable particles (2 weeks)
Grading

The grades will be based on the following components:

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<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Project</td>
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<td>Final Exam</td>
<td>40%</td>
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Each of these components will be graded for clarity, correctness and completeness. The final grade (out of 100) will be mapped so that a grade of 90 or more reflects mastery of the material, a grade of 80 up to 90 reflects competence with the material, a grade of 70 up to 80 reflects partial competence with the material, a grade of 60 up to 70 reflects minimal acceptable competence with the material. Letter grades will be assigned as follows:

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Description of Grade Components

**Homework:** Students will be required to work a set of problems based on and/or extending the material covered in class. The problems could be assigned over the semester based on the material covered.

**Project:** The student is expected to work on a problem related to distributed computing. The problem could be based on a paper from the literature or on a topic of interest to the student that is relevant to the course. Typically, a paper-based project involves thoroughly understanding the given paper (researching any additional background material needed), presenting the work (orally, and in written form), and proposing directions and approaches to extend the work. The goal of the project is to expose students to elements of research and its presentation.

Each student will work on a separate paper/topic. An intermediate and final report is required from each student. Each student must also orally present the key ideas of the project and field any questions arising from the presentation.

Example projects from the last offering of the course include ones based on the following papers from the ACM Symposium on Distributed Computing (PODC), 2016, a leading conference in the area:

- A Polylogarithmic Gossip Algorithm for Plurality Consensus
- Reliable Communication over Highly Connected Noisy Networks
• Specification and Complexity of Collaborative Text Editing

Final Exam: This is a comprehensive exam of the material covered in the course (except those specific to projects).

Expectations

In accordance with LSU’s General Information on Courses, a student should expect to spend at least 6 hours per week on the course (in addition to class time). For more information, see catalog.lsu.edu/content.php?catoid=14&navoid=1030

LSU Student Code of Conduct

The LSU Code of Student Conduct explains students rights and expected student behavior; students are expected to understand this code. This and other information have links from www.lsu.edu/students/saa/students.

Excused Absences

In general, an excused absence is one due to extenuating circumstances (such as medical reasons). More details of LSU’s policy on student absence from class is available at https://sites01.lsu.edu/wp/policiesprocedures/policies-procedures/22/

Disabilities

The University is committed to making reasonable efforts to assist individuals with disabilities in their efforts to avail themselves of services and programs offered by the University. To this end, Louisiana State University will provide reasonable accommodations for persons with documented qualifying disabilities. If you have a disability and feel you need accommodations in this course, you must present a letter to me from Disability Services in 115 Johnston Hall, indicating the existence of a disability and the suggested accommodations.

Academic Success

Academic success in this course hinges on a clear understanding of the concepts and developing good critical thinking abilities. Because some new concepts build on those covered earlier, an important ingredient of success is keeping current with the material covered. Activities that help with this include attending classes regularly, and resolving doubts as early as possible.

The LSU Center for Academic Success (www.lsu.edu/students/cas/) offers guidance on learning strategies, tutoring help, and workshops on subjects ranging from note taking to time management.

The LSU Olinde Career Center (www.lsu.edu/students/careercenter/) can assist you with the choice of your major and suitable professional directions, and to develop a career plan towards these.
EE 7798: Distributed Computing

Course Justification

A distributed computing system is a set of, relatively independent, computing nodes that collectively solve a problem. This encompasses environments ranging from a multicore system on a chip to wide area networks connecting computers over large distances. Such systems are finding increasing use in many modern applications including in cloud computing, distributed databases, the smart grid, autonomous robot swarms, and the Internet-of-Things. However, factors like asynchrony and local knowledge that come with a system consisting of many independent processing elements make distributed computing quite challenging. The possibility of failure of some processing elements in the system and the presence of malicious nodes further complicates the task.

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**Course Description:**

EE 7798 Distributed Computing (3) Also offered as CSC 7598; Prereq: CSC 3102 or equivalent. Distributed computing models, algorithms and applications.

**BUDGET IMPACT (IF ANSWER TO ANY QUESTION IS "YES", ATTACH EXPLANATION.)**

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Department Chair Signature (date)  
Graduate Dean Signature (date)  
John Scalzo lscalz@lsu.edu  
College Contact E-mail

**RECEIVED**

MAR 15 2018  
THE GRADUATE SCHOOL  
LA STATE UNIVERSITY
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Proposal for Converting a Special Topics Course to a Catalog Course

EE 7798: Distributed Computing

Faculty Contact Information
R. Vaidyanathan, 3316V Patrick F. Taylor Hall; 225-578-5238; vaidy@lsu.edu

Office Hours: TBA 100 minutes per week

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