DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE
(Revised: September 2010)

Introduction

Doctoral training in computer science at LSU offers talented students the opportunity to prepare for research careers in universities or industrial laboratories. There is a strong and continuing demand for computer scientists to work at the frontiers of knowledge in both theoretical and applied specialties. The curriculum provides for graduate study in several areas of computer science including algorithms, computer architecture, artificial intelligence, theoretical computer science, software engineering, information retrieval, security, grid computing, networks, database management, operating systems, high performance computing, robotics, scientific computation, programming languages, and compilers.

Degree Requirements

All Graduate School regulations and procedures apply. It is the student's responsibility to read and understand the LSU Graduate School requirements, such as time limitations and residency requirements. The basic process for satisfying the degree requirements for the doctorate is as follows:

1. The student, immediately upon entering the program, contacts the Graduate Advisor of the Department of Computer Science, who serves as the interim advisor. The student and his/her advisor together assess the student's curriculum requirements, and the student begins to schedule courses. A beginning student normally takes three years of graduate course work above the baccalaureate.
2. During the first year of enrollment, the student should initially consider a research specialization area and request a major professor who is involved in that area and is willing to supervise the student's research. The major professor is chosen from the Graduate Faculty in the Department of Computer Science.

   In the event that the research area requires additional supervision from a faculty member not in the Department of Computer Science, a "research advisor" must also be chosen from the Graduate Faculty in that area, subject to approval by the major professor and the Graduate Advisor.
3. By the end of the first year of study, the student should file a plan of study, which specifies research goals and curriculum plans. Once the student's advisory committee, the Chairman of the Department of Computer Science, and the Graduate School, has accepted the plan of study, the student becomes an applicant for the doctorate. Moreover, the student can now begin to fulfill the residency requirement, which consists of two successive regular semesters of full-time coursework.

   With this plan of study, the student requests an advisory committee consisting of the major professor and at least two other faculty members from the Graduate Faculty in the Department of Computer Science. If the student has chosen to have a minor field of study, a professor from the Graduate Faculty in the minor field must be added to the advisory committee. Although each student is responsible for his/her own progress through the program, the advisory committee is responsible for ensuring that the student's curriculum is of high academic quality and appropriate to allow the student to pursue his/her research and career

goals. The committee, chaired by the major professor, also advises the Graduate Advisor and the Chairman of the Department of Computer Science on matters concerning the student. The committee is nominated by the Chairman of the Department of Computer Science and approved by the Dean of the Graduate School. At least two members of the advisory committee must be full members of the Graduate Faculty; the other members of the committee can be full or associate members of the Graduate Faculty.

4. The student continues the course work, as indicated in the plan of study.

   The central focus of the doctoral program is research. The student is encouraged to begin as soon as possible to participate in research, often guided by ongoing faculty research projects. Students should also develop dissertation research plans as early as is reasonable. To facilitate this effort, the student should consider taking reading courses and seminars in the appropriate areas.

5. The student requests permission to take the Written General Examination.
6. After the student has passed the Written General Examination, the student must submit a written proposal of his/her doctoral research project to the student's committee. The proposal will be discussed and defended before the student's advisory committee in the oral general examination. In order to keep the advisory committee informed of progress, the student must meet with the committee at least once every regular semester after the oral defense of the dissertation proposal.
7. Once the student passes the oral examination, the student is admitted to candidacy for the degree. The student should now begin to take the CSC 9000 dissertation research course, if he/she has not already begin to do so. At least nine hours of CSC 9000 must be taken.
8. The student carries out the proposed dissertation research, writes the dissertation, and submits it to his/her advisory committee.
9. The student defends the dissertation in a public oral examination before his/her advisory committee. Formal approval of the dissertation by the committee and by the Graduate School constitutes completion of the requirements for the doctoral degree. The Ph.D. dissertation must be submitted to committee members at least two weeks prior to the final examination date. The room, time, and date of the presentation examination, along with the names of the candidate and advisory committee members, and the title and abstract of the dissertation, must be announced in advance by e-mail to gradsec@bit.csc.lsu.edu (at least three working days before the exam). Failure to follow this policy is sufficient cause for postponement of that date.

Course Work and Dissertation Research Hours

The doctoral degree requires a minimum of thirty-seven credit hours of course work, not including CSC 9000, all with a grade of B or higher.

The following five core courses are required:

CSC 7300 Algorithms
CSC 4890 Theory of Computation
CSC 7101 Programming Languages

CSC 7103 Operating Systems
CSC 7080 Computer Architecture

Students must take at least nine hours of CSC 9000 Dissertation Research.

In addition, students must also take the CSC 7800 Research Seminar. This course is designed to provide a forum for doctoral students to make formal presentations on research topics for evaluation and feedback of technical content and presentation style.

Seven additional courses must be chosen to be taken from at least two of the areas listed below and must include at least five 7000+ level courses. The student's advisor committee must approve the seven courses, which may include CSC 7700 Special Topics courses in specific areas as appropriate.

- Artificial Intelligence and Machine Learning
  - CSC 7333, CSC 7442, CSC 7444, CSC 7446
- Database and Information Retrieval
  - CSC 7481, CSC 7610, CSC 4402, CSC 7702
- Grid and Distributed Computing
  - CSC 7540
- High Performance and Scientific Computing
  - CSC 7560, CSC 7600, CSC 7610, CSC 7620
- Networking
  - CSC 4501, CSC 7501, CSC 7601, CSC 7602, CSC 7701, CSC 7702
- Robotics
  - CSC 7374, CSC 7375
- Security
  - CSC 4601, CSC 7502
- Software Engineering
  - CSC 4330, CSC 4351, CSC 7135, CSC 7235
- Visualization
  - CSC 4356, CSC 7443
- Interdisciplinary Courses
  - Maximum of two graduate level courses

The student's advisory committee may require additional course work.

The Graduate Advisor in conjunction with the Graduate School must approve transfer credit.

English Language Proficiency Requirement

The faculty members administering the General Examination, the student's major professor, and the Chairman of the Department of Computer Science, will determine, at the time of that examination, whether the student is able to write grammatically correct and understandable English prose. If a student's writing skills are evaluated as unacceptable, then the student and his/her advisory committee must devise a plan of study to improve those skills to an acceptable level. Any courses prescribed by this plan must be completed before the student is eligible to submit a dissertation proposal.

General Examination

Upon completion of the core courses, but no later than the end of the fourth semester, a student must take a written general examination covering the five core courses. A student will have two opportunities to pass the examination. If a student does not successfully complete all of the five core course examinations, he/she need only retake the core course examination(s) in which the performance was ruled unsatisfactory. If the student does not successfully pass all areas even after the second attempt, he/she will be dropped from the program.

After the written General Examination, a student must formally request the Graduate School for permission to take the oral general examination. This examination requires a dissertation research proposal, and the full advisory committee of three members plus a fourth added by the Graduate School will examine the student orally. The student must submit a formal, written proposal of his/her dissertation research to his/her advisory committee at least two weeks before the date of the oral examination.

Dissertation and Defense

The primary goal of a doctoral program of study is to ensure that the student is able to conduct independent research. For this reason, each student must prepare a dissertation describing original research in computer science and submit it to his/her advisory committee at least two weeks before the oral examination.

The research must focus on a significant problem in the field of computer science. The dissertation research must be of sufficient quality and depth to merit publication of the results in a refereed scholarly journal. A paper describing the bulk of the research should be submitted to such a journal or accepted for presentation at a refereed national meeting of some relevant professional society. The student is also required to give a seminar on the topic for the other students and the faculty.

The student must defend the dissertation research before his/her advisory committee in a public oral examination. The committee is responsible for supervising this examination. Final approval of the dissertation by the full advisory committee (including the fourth additional member appointed by the Graduate School), and approval by the Graduate School constitute completion of the requirements for the doctoral degree.

Facilities and Equipment

The Department of Computer Science provides state-of-the-art computing facilities for instruction and research. Several platforms and architectures are available for students, faculty, and staffs.

The FreeBSD Network

The FreeBSD network consists of two HP ProLiant servers; one with dual Intel Xeon 3.06 GHz CPUs and 4GB of RAM; one with a Intel Xeon 3.06GHz CPU and 3GB of RAM. This network is equipped with a gigabit network and has total disk space of 600GB. All servers and workstations are running the FreeBSD 5.2 operating system, and are used as the main backbone of the Department for research, education, Internet, e-mail, and such.

The Sun Micro Systems Network

The SUN network consists of a SUN Fire V880 server and twenty-one SUN Blade 150 workstations. The server has two 900MHz UltraSPARC III Cu processors, each with

8MB of cache, and a total of 4GB of RAM and 400GB of disk storage. Each Blade 150 workstation consists of a 650MHz UltraSPARC II-i processor, 512 MB of RAM, 18.1" LCD monitor, and 40 GB of local disk space. The SUN workstations and servers are running the Solaris 9 operating environment. These provide the primary support for computer science classes, currently over 2000 accounts installed per semester. The underlying network consists of a 100/1000 Mbps switched Ethernet, with a fiber link to the campus ATM backbone.

The Microcomputer Network

The Department also has a microcomputer network consisting of twenty Dell Precision 330 Pentium 4 PCs, running the MS Windows XP operating system. The laboratory is used for teaching introductory computer science classes, and available for general use by the LSU community.

Beowulf Clusters

The Department has two Beowulf clusters. The Networking and Multimedia Laboratory has a cluster of twenty-four 650MHz PCs connected via a switched 100Mbps Ethernet network. The cluster is running RedHat Linux, MPI and/or PVM in support of research in the area of parallel and distributed computing. Two high-end graphics workstations serve as the front-end visualization for the cluster. Information Retrieval Testing Bed consists of twelve Dell PowerEdge servers and two IBM pSeries servers connected via a 100 Mbps switch.

Other Departmental Facilities

Other equipment currently utilized by the Department includes several SUN workstations, DEC AlphaStations, Macintosh PowerMacs, a number of PC workstations, scanners, laser and line printers.

Specific research equipment is also utilized in various research laboratories. Currently, the Department houses various research laboratories: Robotics Laboratory, Software Engineering Laboratory, Networking Laboratory, Sensor Networking and CyberSecurity Laboratory, Medical Image Processing Laboratory, and Scientific Computation and Visualization Laboratory. Each laboratory is a self-contained computing facility.

Non-Departmental Facilities

In addition to the Department’s computing facilities, the Department has an access to a variety of other high performance computing facilities via its connection to the university's backbone network. This equipment includes the computational facilities of the LSU Office of Computing Services (OCS) and Center for Computation & Technology (CCT). The High Performance Computing division of OCS offers CASPER (Callaway Advanced Scalable Parallel Environment for Research), which is currently a 26 node IBM SP, RS/6000, and pSeries cluster.

CCT has a several high performance linux based clusters: SuperMike, SuperHelix, and MiniMike. SuperMike consists of 1024 Intel Pentiun IV Xeon 3.06 GHz Processing units. SuperHelix consists of 256 Intel Pentiun IV Xeon 2.0 GHz Processing units. MiniMike consists of 32 Intel Pentium IV Xeon 1.8 GHz Processing units. More details on these clusters can be found at http://www.cct.lsu.edu.

Computer Accounts

The Department of computer science provides its graduate students and undergraduate junior and senior majors with permanent computer accounts for e-mail and web services. The students can use the accounts as long as they are students in the Department. Please refer to the Account Initiation and Termination Policy for details.

Faculty and Research Areas

Gabrielle Allen, Associate Professor; Ph.D. University of Cardiff (UK)
Grid computing with respect to enabling new application scenarios for scientific computing, programming frameworks, parallel programming, scientific computing, numerical relativity, algorithms

Konstatin Busch, Assistant Professor; Ph. D., Brown University
Theory of distributed computing. Distributed algorithms and data structures. Communication algorithms for wireless, sensor, and optical networks. Data streaming algorithms. Algorithmic game theory.

Gerald Baumgartner, Assistant Professor; Ph.D., Purdue University
Compiler optimizations, the design and implementation of domain specific and object-oriented languages, desktop grids, and development and testing tools for object-oriented and embedded systems programming.

Doris L. Carver, Professor; Ph.D., Texas A & M University
Software engineering, formal requirements and specification techniques, programming environments, object oriented development methodologies

Jianhua Chen, Associate Professor; Ph.D., Jilin University (China)
Artificial intelligence, machine learning, database systems, logic programming

Peter P. Chen, LSU Foundation Murphy J. Foster Distinguished Chair Professor; Ph.D., Harvard University
Data models, cyber and homeland security, software engineering, knowledge-based systems.

S. Sitharama Iyengar, Professor and Chairman; Ph.D., Mississippi State University
Parallel algorithms, data structures, algorithmic complexity, robotics, and computer vision

Rajgopal Kannan, Assistant Professor; Ph.D., University of Denver
Sensor networks, security, routing, distributed systems, algorithms, game-theoretic network control

Bijaya Karki, Assistant Professor; Ph.D., University of Edinburgh (UK)
High-performance computing, simulation and modeling, visualization

Tevfik Kosar, Assistant Professor; Ph.D., University of Wisconsin
Distributed systems, Grid and collaborative computing

Sukhamay Kundu, Associate Professor; Ph.D., University of California at Berkeley
Database systems, artificial intelligence, algorithms, graph theory

Supratik Mukhopadhyay, Assistant Professor; Ph.D. Max Planck Institute for Computer Science (Germany)
Software Verification, Software Engineering

Seung- Jong Park, Associate Professor; Ph.D., Georgia Institute of Technology.

Wireless Sensor Networks, Wireless Ad-hoc Networks, High Speed Networks for Grid Computing, Networks Convergence

Rahul Shah, Assistant Professor; Ph. D., Rutgers University

Algorithms, Data Structures, Databases Specifically: Compressed Data Structures, Uncertain Databases, Disk-bound Algorithms and Data Structures

Thomas Sterling, Professor; Ph.D., Massachusetts Institute of Technology

Associative Template Dataflow, Beowulf class PC/Linux cluster computing, Continuum Computer Architecture.

Edward Seidel, Professor and Director of the Center for Computation and Technology (CCT); Ph.D., Yale University

General relativity, relativistic astrophysics, grid computing, computational science, and high performance computing

Evangelos Triantaphyllou, Professor ; Ph. D., Pennsylvania State University

Data Mining, Decision Making.

Byygg Ullmer, Professor; Ph.D., Massachusetts Institute of Technology

Visualization

Jian Zhang, Assistant Professor; Ph. D., Yale University.

Machine learning, Data Analysis Algorithms

John M. Tyler, Professor Emeritus; Ph.D., Louisiana State University

Parallel and vector algorithms, high performance scientific computing, numerical analysis, simulation and modeling

Donald H. Kraft, Professor Emeritus; Ph.D., Purdue University

Information retrieval, information science, fuzzy set theory, rough sets, operations Research.

Shantenu Jha, Adjunct Professor;

Triple point of Computational Science, Distributed Cyberinfrastructure Development and Computer Science

Hartmurt Kaiser, Adjunct Professor;

Robert Kooima, Adjunct Professor;

Xin Li, Adjunct Professor;

Shape Mapping (Surface Mapping and Volumetric Mapping), Shape Analysis/Comparison/Retrieval,Shape Partitioning/Segmentation, Shape(Surface/Volume) Parameterization/Remeshing

Admission Requirements

Regular admission to the Ph.D. program requires a comprehensive computer science background, a satisfactory grade point average (in general, at least 3.0), satisfactory performance on the Graduate Record Examinations (at least 700 on the quantitative portion score, and at least 1250 on the sum of the quantitative portion score added to the verbal portion score), proficiency in English, strong recommendations and a proven research track record.

Foreign students who have not graduated with a degree from an English-speaking university must furnish their TOEFL scores. An acceptable TOEFL score is at least 550 on paper (600 on paper to be considered for a graduate assistantship) or 213 via computer.

Consideration will be given to applicants who fail to meet one or more of these requirements but show outstanding promise in other ways.

Deadline for Application for Admission

Applications for admission to this doctoral degree program must be submitted by the deadlines listed below.

Deadline for admission to the fall semester	February 1st
Deadline for admission to the spring semester	October 15th

However, applicants should strive to get their application materials submitted as early as possible, prior to these deadlines, in the academic session immediately preceding the one in which admission is sought.

Financial Aid for Graduate Students

Students, once they have been admitted, will be automatically considered for financial assistance. All financial assistance is awarded on an annual basis, with no award implying automatic renewal from year to year. Graduate teaching assistantships are awarded to graduate students for a maximum period of five years, except for special circumstances, to be justified by the student's major professor and the Department Chairman. A student's assistantship is terminated at the end of the fifth year of the award.

More Information

For further information about the Doctoral Degree Program in Computer Science and Department assistantships, contact:

Professor S. Sitharama Iyengar, Chairman
Department of Computer Science
Louisiana State University

Baton Rouge, Louisiana 70803-4020
USA. Phone: (225) 578-1252 Fax: (225) 578-1465
E-Mail: iyengar@bit.csc.lsu.edu

To obtain more information about the following items, write or call the office listed:

Graduate Applications and Fellowships:

Office of Graduate Assistantships
131 David Boyd Hall
Baton Rouge, LA 70803 USA
Phone: (225) 578- 1687 Fax: (225) 578- 1370
Email: egbarbin@lsu.edu

Admission Procedures and Requirements:

Louisiana State University Graduate School
114 David Boyd Hall
Baton Rouge, LA 70803 USA
Phone: (225) 578-2311 Fax: (225) 578-2112
Email: graddeanoffice@lsu.edu

International Students:

International Services Office
101 Hatcher Hall
Louisiana State University
Baton Rouge, LA 70803 USA
Phone: (225) 578-3191 Fax: (225) 578-1413

Student Loan and College Work-Study:

Office of Student Aid & Scholarships
202 Himes Hall/208 Coates Hall
Louisiana State University
Baton Rouge, Louisiana 70803-3701
Student Aid Phone: (225) 578-3103
Scholarships Phone: (225) 578-3087
Email: financialaid@lsu.edu

Housing:

Department of Residential Life
99 Grace King Hall
Louisiana State University
Baton Rouge, Louisiana 70803-6903
Phone: (225) 578-8663 Fax: (225) 578-5576
Email: reslife@lsu.edu