

MASTER OF SCIENCE IN SYSTEMS SCIENCE

(Revised: 22nd Aug 2008)

I. Introduction

This interdisciplinary program offers the advanced education necessary for a career in computer systems applications in a wide variety of areas. The curriculum provides for graduate study in such core topics as theory of computing, computer science principles, data management and software systems development, visualization and graphics, and high performance computing. In addition, the student may choose any systems-related area for specialization and application of the techniques from these core areas. Graduates from the program are prepared to attack problems of current social and technological interest such as resource allocation, process control, library automation, information systems management, database administration, and high performance computing. The student is expected to design his or her own curriculum, choosing an area for specialization, subject to the requirements outlined below.

II. Curriculum Requirements

In no case will more than twelve hours of computer science course work be counted towards the Master's Degree in Systems Science. In general, it is expected that the student will take twelve hours of computer science course work, at least half numbered 7000 or above.

The student may select one of two combinations of coursework and research, for a total of 36 hours. These are:

I: 24 hours of coursework plus thesis

- a. Core requirement: 12 hours chosen from at least two core groups. At least 6 hours must be from courses numbered 7000 or above.
- b. Specialization: 12 hours of approved courses in a systems-related area. At least 6 hours must be numbered 7000 or above.
- c. Research requirement: 12 hours of SYSC 8000 Systems Science Thesis Research.
- d. Examination requirement: Pass an oral examination on the thesis.

II: 30 hours of coursework plus system design project

- a. Core requirement: 15 hours chosen from at least three core groups. At least 9 hours must be from courses numbered 7000 or above.
- b. Specialization: 12 hours of approved courses in a systems-related area. At least 6 hours must be numbered 7000 or above.
- c. Elective: 3 hours.
- d. Research requirement: 6 hours of SYSC 7090 Systems Science Design Project.
- e. Examination requirement: Pass an oral examination on the system design project.

The final list of courses submitted to fulfill the degree requirements must conform to the requirements of the Graduate School. In addition, the student must maintain at least a B average in all courses taken to satisfy the specialization requirements, as well as a B average overall.

The Chairman of the Department of Computer Science and the student's committee are responsible for ensuring that the student's curriculum is of high academic quality. However, the student is responsible for his/her own progress through the program. Each student has a committee of at least three Systems Science Faculty members. The student, immediately upon entrance into the program, must contact the Graduate Advisor of the Department of Computer Science. A plan of study must be completed and signed by the end of the student's first semester in the program. By the end of the second semester of enrollment in the program, the student must choose a specialization area and request a major professor, who must also be from the Systems Science faculty. By the end of his/her second semester in the program, the student must obtain approval of the choice of the specialization field and the courses to be taken in order to satisfy the degree requirements.

The other committee members, who must also be from the Systems Science faculty, and the major professor are nominated by the Chairman of the Department of Computer Science. The student should consult his/her advisor on a regular basis (at least once a semester) since only this faculty member can approve curricular requests.

The major professor is chairman of the committee and ordinarily serves as the research advisor, who supervises the thesis or system design project. The thesis or design project topic must be specified in writing by the student and approved by both the student's major professor and the Chairman of the Department of Computer Science. Alternatively, the student may request that a fourth member be added to the committee as research advisor. In such cases, the research advisor need not be a member of the Systems Science faculty, but must be a member of the Graduate Faculty and must be from a systems-related area. The Chairman of the Department of Computer Science must approve the research advisor.

The committee advises the Graduate Advisor and the Chairman of the Department of Computer Science on matters concerning the student's curriculum and progress therein, and supervises the oral examination.

III. The Core Groups

The basis of the Systems Science curriculum is a set of five Core Groups, from which the student must select a portion of the coursework offered for credit toward the degree for credit toward the degree. The following is a list of the Core Groups and a partial list of the courses in each group.

Group I: Theory of Computing

The study of the mathematical theory of computation and general systems, including systems theory, mathematics, and formal languages.

CSC 4890 Introduction to the Theory of Computation
CSC 7200 Theory of Computation I
CSC 7201 Theory of Computation II
CSC 7300 Algorithm Design and Analysis
EXST 7003 Statistical Inference I
MATH 4171 Theory of Graphs

MATH 4172 Combinatorics

Group II: Computer Science Principles

The study of compiler design, programming languages, artificial intelligence, architecture, and operating systems.

CSC 4101 Programming Languages
CSC 4103 Operating Systems
CSC 4351 Compiler Construction
CSC 4444 Artificial Intelligence
CSC 4446 Fuzzy Sets and Applications
CSC 4501 Computer Networks
CSC 4601 Computer and Network Security
CSC 7080 Computer Architecture
CSC 7101 Programming Language Structures
CSC 7103 Advanced Operating Systems
CSC 7333 Machine Learning
CSC 7444 Advanced Artificial Intelligence
CSC 7540 Distributed Systems
CSC 7501 Advanced Computer Networks
CSC 7602 Wireless Networks
CSC 7502 Advanced Computer and Network Security
CSC 7702 Telecommunications Networks
EE 4710 Communications in Computing
EE 4730 Structure and Design of Digital Computers

Group III: Data Management and Software Systems Development

The study of logically and physically organizing, storing, and retrieving data, and developing large software systems, including software engineering.

CSC 4330 Software Systems Development
CSC 4402 Introduction to Database Management Systems
CSC 7135 Software Engineering
CSC 7235 Advanced Software Engineering
CSC 7402 Database Management Systems
CSC 7442 Data Mining and Knowledge Discovery
CSC 7481 (or LIS 7610) Information Retrieval Systems
LIS 7013 Evaluation of Information Systems
LIS 7501 Management of Information Systems
LIS 7502 Networks for Information Centers
LIS 7605 (also CSC 7406) Information Science
LIS 7606 (also CSC 7407) Abstracting and Indexing
LIS 7607 (also CSC 7410) Electronic Information Resources

Group IV: Visualization and Graphics

The study of the mathematical fundamentals and algorithms for computer based geometric models of physical systems.

ME 4573 (or CSC 4356) Interactive Computer Graphics

ME 4583 (or CSC 4357) Applied Interactive Graphics and Computer-Aided Design
ME 7253 Advanced Computer-Aided Design
ME 7263 Computer-Aided Geometric Modeling
CSC 7380 Introduction to Computational Geometry
CSC 7443 Scientific Information Visualization

Group V: High Performance Computing

The study of numerical algorithms and simulation tools for parallel computing in order to solve large (e.g., grand challenge) problems.

CSC 4362 Advanced Numerical Methods
CSC 7373 Algorithms for Parallel and Distributed Computing
CSC 7560 Programming and Performance Evaluation of Parallel Computing
CSC 7560 Computational Methods
CSC 7600 High Performance Computing I
CSC 7610 High Performance Computing II
CSC 7620 High Performance Computing III
PHYS 7411 Computational Physics
PHYS 7412 Computational Physics

IV. Specialization Area

Normally, this would be an area in which the student applies the knowledge obtained from the core coursework; although the student may choose a Core Group for specialization. Some examples are a physical science (e.g., physics), a life science (e.g., biological science), a social science (e.g., psychology), a field of engineering (e.g., industrial engineering), mathematics, a field in business (e.g., information systems and decision sciences), and library and information science (a student who wishes to specialize in this area may want to consider a joint degree). Whether the student elects the thesis or system design project, the research must be in the specialization area and the research advisor must be knowledgeable in that discipline.

VI. Thesis

The student who chooses SYSC 8000 must prepare and defend a Master's thesis. The topic of the thesis must be consistent with the subject area of specialization field and the thesis work must include significant application of the techniques of systems science to a problem of interest in that field. The student must obtain his or her advisory committee's written approval of the thesis topic prior to beginning the thesis work. A public oral defense of the thesis before this committee is required.

VII. System Design Project

The student who chooses SYSC 7090 must submit a system design project as part of the requirements for the degree. This project normally consists of a thoroughly documented computer system in the student's specialization field. The student must obtain his/her advisory committee's approval prior to beginning the project work. A public oral defense of the system design project before the student's committee is required.

VIII. Faculty

Faculty members from multiple departments of Louisiana State University, Southern University, and the University of Southwestern Louisiana may participate in the Systems Science program. The following are the current Graduate Faculty participants:

- Dr. Gabriella Allen, Associate Professor of Computer Science (LSU)
 - Dr. Gerald Baumgartner, Assistant Professor (LSU)
 - Dr. Konstantin Busch, Assistant Professor (LSU)
 - Dr. Doris Carver, Professor (LSU)
 - Dr. Jianhua Chen, Associate Professor of Computer Science (LSU)
 - Dr. Peter P. Chen, Foundation Murphy J. Foster Distinguished Chair Professor of Computer Science (LSU)
 - Dr. S. Sitharama Iyengar, Roy Paul Daniels Professor and Chairman of Computer Science (LSU)
 - Dr. Rajgopal Kannan, Assistant Professor of Computer Science (LSU)
 - Dr. Bijaya Bahadur Karki, Assistant Professor of Computer Science (LSU)
 - Dr. Tevfik Kosar, Assistant Professor of Computer Science (LSU)
 - Dr. Donald H. Kraft, Professor Emeritus of Computer Science (LSU)
 - Dr. Sukhamay Kundu, Associate Professor of Computer Science (LSU)
 - Dr. Seong Jung Park, Assistant Professor of Computer Science (LSU)
 - Dr. Rahul Shah, Assistant Professor of Computer Science (LSU)
 - Dr. Thomas Sterling, Professor of Computer Science (LSU)
 - Dr. Evangelos Triantaphyllou, Professor of Computer Science (LSU)
 - Dr. John Tyler, Professor Emeritus of Computer Science (LSU)
 - Dr. Brygg Ullmer Assistant Professor of Computer Science (LSU)
 - Dr. Jian Zhang, Assistant Professor of Computer Science (LSU)
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- Dr. Bert R. Boyce Professor Emeritus of Library and Information Science (LSU)
 - Dr Shantenu Jha, Assistant Research Professor of Computer Science (LSU), Sr. Research Scientist at the Center for Computation and Technology (CCT)
 - Dr. Carol Barry Associate Professor of Library and Information Science (LSU)
 - Dr. Ye-Sho Chen Associate Professor of Information Systems and Decision Sciences (LSU)
 - Dr. Armando B. Corripio Professor of Chemical Engineering (LSU)
 - Dr. Jerry Draayer Professor of Physics and Astronomy (LSU)
 - Dr. Suren N. Dwivedi Endowed Chair Professor of Manufacturing (USL)
 - Dr. Charles A. Harlow Professor of Electrical and Computer Engineering (LSU)
 - Dr. E. Hinds Professor and Chairman of Computer Science (SU)
 - Dr. Andrea Houston Associate Professor of Information Systems and Decision Sciences (LSU)
 - Dr. J. Bush Jones Professor of Computer Science (LSU)
 - Dr. Ralph W. Pike Professor of Chemical Engineering (LSU)
 - Dr. J. Ramanujam Associate Professor of Electrical and Computer Engineering (LSU)
 - Dr. Ed Seidel Professor of Computer Science and CCT Director (LSU)
 - Dr. Neal W. Stolfus Professor of Mathematics (LSU)
 - Dr. Joel Tohline Professor of Physics & Astronomy (LSU)
 - Dr. Warren Waggenpack Associate Professor of Mechanical Engineering (LSU)

IX. Departmental Policies

M.S. Examinations

MS project report/thesis must be submitted to committee members at least one week prior to the final presentation examination date. Failure to follow this policy is sufficient cause for postponement of that date if any committee members so desire.

Announcement of Project/Thesis exams to the departmental faculty and students

The room, time, and date of the presentation examination date must be announced in advance by both e-mail to cscworld and by posting on the Bulletin Board B1 (at least three working days before the exam). Failure to do so is sufficient cause for postponement of that date if any systems science faculty member raises a complaint.

Graduate Teaching Assistantships

The Assistantships are awarded to graduate students for a maximum period of two years, except in special circumstances that must be justified by the student's major professor and the department chair. In general, the assistantship will be automatically terminated at the end of the second year.

Status

The admission committee will notify the originating or current enrolled department of LSU of the status of a student who transfers into systems science or who is accepted as a dual degree student.

Residency Rule of the department

- A student must be enrolled two semesters as a full-time student.
- Residency begins with the semester following the student's notification of acceptance in the program. Summer semester does not apply towards the criteria requirement.
- The student must have completed at least six Computer Science hours (at the 4000 or 7000 level) during the residency.

X. 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 Pentium IV Xeon 3.06 GHz Processing units. SuperHelix consists of 256 Intel Pentium 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.

XI. Entrance Requirements

The entrance requirement is a bachelor's degree in a systems-related area from an accredited college or university. This undergraduate preparation must include the following courses or their equivalents:

- a. Differential and Integral Calculus (9 sem. hours)
- b. A high-level programming language (3 sem. hours)
- c. Assembly language programming or linear algebra (3 sem. hours)
- d. Numerical methods or a second high-level programming language (3 sem. hours)
- e. Statistics (3 sem. hours)
- f. Advanced Data structures and Algorithms (3 sem. hours)

Gifted students who have not satisfied these requirements may be admitted to the program on probation provided that the deficiencies are successfully made up (usually by Pass/Fail) by the end of the first semester in the program. Such students might require more than the usual amount of time necessary to satisfy the degree requirements. Admission is on a competitive basis, with GRE (Graduate Record Examination) scores, undergraduate records, and recommendations used to determine those students who are accepted into the program. Financial aid is also available on a limited, competitive basis.

XII. Other Related Programs

The Masters Degree Program in Systems Science is a general, interdisciplinary program leading to a Master's Degree in Systems Science. It is not a computer science degree program and should not be construed as one in any way. Students who wish to pursue a Master's degree in computer science should apply to the Department of Computer Science at Southern University of Baton Rouge or to the Department of Computer Science at the University of Southwestern Louisiana in Lafayette. In addition, there is the Library and Information Science - Systems Science Joint Degree Program. In order to meet the growing demand for information professionals trained in library science and computer science, this program has been implemented. It prepares information professionals knowledgeable in systems and computer applications, and provides the requisite background for careers in library systems development, online bibliographic retrieval research, and the administration of information centers. Students in this program earn both the Master's Degree in Library Science and the Master's Degree in Systems Science for a total of fifty-eight semester hours. For more information on this dual degree program, contact:

Professor Beth Paskoff, Dean
School of Library and Information Science, Louisiana State University
Baton Rouge, Louisiana 70803
Phone: (225) 578-3158

XIII. Deadlines for Application of Admission

Applications for admission to the Masters Degree Program in Systems Science should be submitted as early as possible in the academic session immediately preceding the one in which admission is sought. The deadlines listed below must be observed in order to allow careful evaluation of all applicants' requirements for admission to this program. All materials must be received by the LSU Department of Computer Science by the deadlines listed below:

- Deadline for admission to the fall semester February 1st
- Deadline for admission to the spring or summer semesters October 15th

XIV. Financial Aid for Graduate Students

Students who have been admitted will automatically be considered for financial assistance. No additional application form is required for consideration for financial aid.

XV. More Information

For further information on the Masters Degree Program in Systems Science, 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@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