

SOUTHERN UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE
UNDERGRADUATE PROGRAM

2014 - 2016



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The Department of Computer Science

The Department seeks to improve the scientific literacy of all students. The Department provides a liberal education in the sciences through course offerings to majors and non-majors.

The Department of Computer Science promotes academic excellence through counseling and scholarly activities that encompass courses of study that provide the foundation necessary for graduate work, professional training and advancement, and a successful career as a scientist. Courses of study enable future teachers to provide basic instruction in areas of science and other educational programs. Graduates of the department receive an education that prepares them to apply theoretical and practical solutions to societal problems.

We strive to instill in students an appreciation for science as an area of human experience used in exploring and understanding the universe; research and cooperative work experience for students form an integral part of its educational programs.

History

The Department of Computer Science was established as a distinct instructional unit in the College of Sciences at Southern University in 1968 and moved to College of Engineering and Computer Science in 2014. Over the last 40 plus years over 3,000 degrees, both Bachelors and Masters were awarded. Our students have pursued careers in various businesses and educational enterprises.

Currently our program serves well over 300 majors. In addition, the department offers a variety of service courses to over 500 non-majors who seek practical experience in the application of information technology. Our department offers two programs, BS and MS. The undergraduate program offers students the Scientific Option and the Information Systems Option, both leading to the Bachelor of Science

Degree. This program and its options are accredited by the Computing Accreditation Commission of ABET (<http://www.abet.org>)

Our department has a foundation of quality in education and research instituted by its founders. Our Bachelor of Science degree program has a long history it was established during a time when computer science was just becoming recognized as a major discipline in universities across the country. The department built on its strong foundation in computer science to add additional programs over the years.

Undergraduate Program

The undergraduate program in Computer Science prepares students to pursue further studies in Computer Science or in related fields of Science, Engineering, and Business and to enter the work force as an entry level computer and information technology professionals. The program combines a very thorough preparation in the fundamentals of Computer Science and related fields.

There are two options to choose from in our undergraduate program, Scientific Option and Information Systems Option. The Scientific Option provides the student with a firm foundation for graduate study, scientific research, and careers in scientific computing. The Information Systems Option provides firm foundations for graduate study, research, and job careers in commercial settings.

Student Outcomes

- ▶ An ability to apply knowledge of computing and mathematics appropriate to the discipline,
- ▶ An ability to analyze a problem, identify and define the computing requirements appropriate to its solution,
- ▶ An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs,

- ▶ An ability to function effectively on teams to accomplish a common goal,
- ▶ An understanding of professional, ethical, legal, security and social issues and responsibilities,
- ▶ An ability to communicate effectively with a range of audiences,
- ▶ An ability to analyze the local and global impact of computing on individuals, organizations, and society,
- ▶ Recognition of the need for and an ability to engage in continuing professional development,
- ▶ An ability to use current techniques, skills, and tools necessary for computing practice.

Our program emphasizes the following ten core areas in computer science:

1. Algorithms and Data Structures
2. Programming Languages
3. Computer Architecture
4. Numerical and Symbolic Computation
5. Operating Systems
6. Database Management
7. Data Networking
8. Software Design and Methodology
9. Artificial Intelligence
10. Human-Computer Interaction

Admission Requirements

Students are considered to be fully registered in Computer Science when they satisfy both the requirements of the College of Engineering and Computer Science and the Department. These requirements are outlined below.

College Requirements

English	6 hours
Mathematics	6 hours
History	6 hours
Science	7 hours

Department Requirements

Students transferring from the University College and the College of Engineering and Computer Science must have completed:

1. CS 110, 111, 190 and 191 with a grade of “C” or better
2. Mathematics 264 with a grade of “C” or better

Transfer students from Southern University-New Orleans, Southern University-Shreveport and other universities must satisfy all criteria listed above.

For more information contact SU Admissions at (225) 771.2430.

Degree Requirements

The Computer Science Scientific Option requires 120 semester hours, of which 56 must be in Computer Science, 12 hours in Natural Science, 14 hours in Mathematics. The Computer Science Information System Option requires a total of 120 semester hours, of which 47 hours must be in Computer Science, 12 hours in Natural Science, 12 hours in Business, and 14 hours in Mathematics. Students must earn a minimum grade of “C” in all required and elective courses in Computer Science, Biology, Chemistry, Physics, Mathematics, and Business. See Appendix for specified course requirements for both options.

Computer Science Elective Courses

A computer Science student may select computer science electives from our exciting list of courses, which provides breadth and depth for the student’s professional growth. Any 300-level or 400-level computer science course may be used as student’s computer science elective

CMPS 250	Introduction to Programming w/ COBOL
CMPS 271	Java Programming
CMPS 285	System Administration and Maintenance
CMPS 305	Social Networking
CMPS 307	Numerical Analysis
CMPS 310	Gaming I
CMPS 315	Information Systems
CMPS 318	Animation I
CMPS 335	Wireless Sensor Networks
CMPS 350	Web based Programming
CMPS 365	Computer, Information and Society
CMPS 371	Advanced Object-Oriented Programming
CMPS 372	Cloud Computing
CMPS 375	Introduction to Information Security
CMPS 380	Software Process Quality
CMPS 387	Object-Oriented Design Patterns
CMPS 388	Human-Computer Interaction
CMPS 390	Data Base Programming
CMPS 402	Computer Organization
CMPS 404	Compiler Construction
CMPS 410	Gaming II
CMPS 418	Animation II
CMPS 425	Robotics
CMPS 432	Distributed Processing
CMPS 433	Telecommunications
CMPS 434	Graph Theory and Networks
CMPS 435	Neural Networks
CMPS 436	Parallel Computing and Application
CMPS 455	Special Projects
CMPS 470	Computer Graphics
CMPS 480	Artificial Intelligence

Non Computer Science Elective Courses

Some computer science courses are designed primarily for non-majors and cannot be used as electives, Introduction to Computer Technology (CMPS 105), C Programming (CMPS 270), Microcomputer Applications in Business (CMPS290), Advanced Techniques Using Spreadsheets (CMPS 291).

African American Experience Requirements

Students, who were first-time freshmen at any post-secondary institution on August 1, 1991, or at any time thereafter, will be required to pass a three credit hour course in African-American Studies before graduation. Students satisfying this requirement by electing one of the several African-American related courses in the Arts and Humanities.

English 203	Intro to Black American Literature
English 313	Black American Literature
English 407	Black Literature of the Deep South
English 413	Modern Black Prose Fiction
English 414	Contemporary Black American Poetry
History 311	Black American History
History 401	History of the American Negro
Music 352	Music of Black Americans: A Survey of Afro –American Music
Music 353	History of Jazz

Note: English 203 will satisfy both requirements African American Experience and English Literature.

Mathematics

Reviews of sequence of courses for computer science are as follows:

Math 135, 140, 264, 265, 364 and 370. A student may take Math 233, 250, 276 concurrently with 264, 265, 364, or 370.

Community Service Requirements

The university policy is that “students who were first-time freshmen at any post-secondary institution on August 1, 1991 or at any time thereafter will be required to complete a minimum of 60 clock hours of community service as one of the requirements for graduation.” The registrar’s office, through the

Office of Service Learning, will verify the completion of that requirement either for credit or noncredit.

For more information regarding this requirement see the Community Service Program on campus or talk with your advisor.

Academic Advisement

Once the student has been admitted into the Department, a computer science advisor will be assigned to the student by the department chairperson. The most important thing to remember is that proper advisement is the key to success. Hence, the student should do the following.

- ▶ Schedule an appointment with your advisor in order to develop a progressive study plan
- ▶ Periodically update your records and study plan with your advisor
- ▶ Seek your advisor’s approval before adding or dropping a class

Your advisor is responsible for:

- ▶ Determining the requirements and sequence of format coursework for your study plan
- ▶ Evaluating your overall academic performance
- ▶ Assisting you in selecting suitable electives
- ▶ Approving the number and level of Computer Science and related courses in any given semester.
- ▶ Determining the sequence of course which will allow the student to graduate (complete the program) in the least possible time
- ▶ Informing the student of possible date of graduation

Student Organizations

There are four student organizations in the departments:

- ▶ The Association of Computing Machinery (ACM)
- ▶ Association for Information Technology Professional (AITP)
- ▶ Upsilon Pi Epsilon (UPE) Honor Society
- ▶ The Robotics Club

All students are encouraged to join ACM and/or AITP upon acceptance into the department. Membership in UPE is invitational based upon a grade point average of 3.0 or above in the junior or senior year.

Scholarships

The department supports a small number of scholarships (over a period not to exceed eight (8) semesters). Once awarded, the student must maintain a GPA of 3.0 or better in order to retain the scholarship.

Online Degree Program

We are dedicated to providing innovative undergraduate, graduate, and continuing professional education and now at a better convenience to you. In addition to the traditional degree program, the Department offers online courses. For more information contact 225-771-2060 or www.cmps.subr.edu



INCOMING FRESHMEN

University Admission Checklist

You have completed the application process when all of the items listed below have been received by Office of Admissions:

- Application for Admission
- Official transcripts from each institution attended
- A copy of ACT or SAT scores
- A copy of immunization records
- A copy of social security card
- Application fee: \$20 (U.S Citizens) or \$30 (non-U.S Citizens) money order

Department’s Important Reminders

- ▶ Graduate-level courses may not be used for undergraduate degree credit.
- ▶ Students will not be allowed to take more than 12 hours of Computer Science per semester.
- ▶ No course substitution is allowed for core computer science courses
- ▶ All students must earn a grade of “C” or better in English 110 and 111
- ▶ Applications for graduation are due the semester before the student plans to graduate.
- ▶ Humanities Electives can be satisfied with (HIST 114, 115, 230, 311*, 399, 401, 410*, 463, 486*); three hours must be in literature (ENGL 201, 203*, 204, 205).
- ▶ Social Science can be satisfied with three hours of ECON 200 or ECON 205 and the remaining three hours must be selected from the following series of courses: economics (ECON 210, 370); geography (GEOG 210, 221, 401); political science (POLS 200, 210, 320, 402); sociology (SOCL 210, 324, 448); and psychology (PSYC 210, 315, 350).
- ▶ Art Electives can be satisfied with ARTS 200,210/211, 320, 330 and 440; MUSIC 200, 250/251, 352,353 and SPEECH AND THEATER 360.
- ▶ If you have any questions or concerns, remember the faculty and staffs in the Department of Computer Science are always available to serve you. Give us a call at (225) 771.2060.
- ▶ For latest news and updates, don’t forget to like Southern University Computer Science Department on Facebook!

	FALL	SPRING
Required		
	190	190
	191	191
	200	201
	300	334
	302	378
	360	402
	370	407
	378	412
	400	420
	415	450/451
	450/451	OPEN
Elective		
	250	OPEN
	271	285
	350	310
	365	315
	372	371
	387	375
	432	432
	470	433
	OPEN	480



CALL US

@

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The Department of Computer Science has thirteen (13) faculty members with various interests in the areas of Telecommunications, Networking, Neural Networks, Software Engineering, Object-Oriented Programming, Multimedia Design, Web Programming, Game Programming, Computer Ethics, Robotics, Machine Learning, and Artificial Intelligence.

Dr. Ebrahim Khosravi, **Professor and Chair**, Research Interest: Network, Electronics, Theoretical Computer Science, and Robotics

Mr. Alvin Allen, Research Interest: Cloud Computing, Sensor Networking, Software Engineering, Semantic Webs

Dr. Shuju Bai, Research Interest: Bioinformatics, High Performance Computing, Big Data, and Database Management

Dr. Marilyn Antoine, Research Interest: Computer Literacy, Spreadsheet Engineering, Business and Financial modeling, Self-Efficacy

Dr. Nigel Gwee, **Curriculum Chair**, Research Interest: Machine Learning, Algorithmic Complexity, and Ubiquitous Computing

Mr. Alonzo Johnson, **Undergraduate Coordinator**, Research Interest: Operating Systems

Dr. Osman Kandara, Research Interest: Software Engineering, Data Mining, Robotics, Internet Security, and Algorithmic Development

Dr. Mathieu Kourouma, Research Interest: Wireless Communications, Computer Architecture, Networking, Applications Development, and Database Design

Dr. Douglas Moreman, Research Interest: Artificial Intelligence, Computer Graphics, Robotics

Dr. Md Abdus Salam, **Graduate Coordinator**, Research Interest: Wireless Sensor Networks, Computer Architecture and Networking

Dr. Liuxi Tan, Research Faculty: High Temperature Alloy Computation.

Dr. Sudhir Trivedi, Research Interest: Neural Networks and Distributed Processing

Dr. Shizhong Yang, Research Interest: High Performance Computation Algorithm, Software Design, 3D Visualization of Scientific Data, Digital Signaling Processing, Data Mining Application in Material Science and Bioinformatics

Southern University- Computer Science Department
Course Requirements – Scientific Option
2014-2016

Freshman Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Modular Programming I	CMPS 190	3	Modular Programming II	CMPS 191	3
English	ENGL 110	3	English	ENGL 111	3
History of Civilization	HIST 114	3	History of Civilization	HIST 115	3
Health/Physical Education	PHED	2	Analytical Geom. Cal II	MATH 265	4
Analytical Geom. Cal I	MATH 264	4	Computer Science Seminar	CMPS 111	1
Computer Science Seminar	CMPS 110	1			
Total		16	Total		14

Sophomore Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Discrete Structures	CMPS 200	3	Data Structures	CMPS 201	3
English	ENGL 203	3	General Biology or Chemistry	BIOL/CHEM	4
Linear Algebra	MATH 233	3	Scientific Programming	CMPS 360	3
General Physics	PHYS 221	3	General Physics	PHYS 222	3
General Physics Lab	PHYS 223	1	General Physics Lab	PHYS 224	1
Statistics	MATH 276	3			
Total		16	Total		14

Junior Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Programming Languages	CMPS 300	3	Digital Data Networks	CMPS 334	3
Computer Organization	CMPS 302	3	Object-Oriented Program	CMPS 370	3
CMPS Elective	CMPS	3	Software Engineering	CMPS 378	3
Foreign Language I	FOLG 100	3	Foreign Language II	FOLG 101	3
Social Science Elective		3	Social Science Elective		3
Total		15	Total		15

Senior Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Operating Systems	CMPS 400	3	Computer Architecture	CMPS 402	3
Numerical Methods	CMPS 407	3	Database Management Sys	CMPS 420	3
Theory of Computing	CMPS 412	3	Capstone Project II	CMPS 451	2
Humanities Elective	HUMN	3	CMPS Elective		3
Arts Elective	ARTS	3	Free Elective		3
Capstone Project I	CMPS 450	1			
Total		16	Total		14

Southern University- Computer Science Department
Course Requirements – Information Systems Option
2014-2016

Freshman Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Modular Programming I	CMPS 190	3	Modular Programming II	CMPS 191	3
English	ENGL 110	3	English	ENGL 111	3
History of Civilization	HIST 114	3	History of Civilization	HIST 115	3
Health/Physical Education	PHED	2	Analytical Geom. Cal II	MATH 265	4
Analytical Geom. Cal I	MATH 264	4	Computer Science Seminar	CMPS 111	1
Computer Science Seminar	CMPS 110	1			
Total		16	Total		14

Sophomore Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Discrete Structures	CMPS 200	3	Data Structures	CMPS 201	3
General Biology or Chemistry	BIOL/CHEM	4	English	ENGL 203	3
Linear Algebra	MATH 233	3	Bus Elective		3
General Physics	PHYS 221	3	General Physics	PHYS 222	3
General Physics Lab	PHYS 223	1	General Physics Lab	PHYS 224	1
			Statistics	MATH 276	3
Total		14	Total		16

Junior Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Programming Languages	CMPS 300	3	Digital Data Networks	CMPS 334	3
Computer Organization	CMPS 302	3	Object-Oriented Program	CMPS 370	3
CMPS Elective	CMPS	3	Software Engineering	CMPS 378	3
Foreign Language	FOLG 100	3	Foreign Language II	FOLG 101	3
Management Behavior	MGMT 300	3	Quantities Business Analysis	MGMT 306	3
Total		15	Total		15

Senior Year

First Semester			Second Semester		
Course	Number	Credit	Course	Number	Credit
Operating Systems	CMPS 400	3	Database Management Sys	CMPS 420	3
System Analysis	CMPS 415	3	Capstone Project II	CMPS 451	2
Business Elective		3	Social Science Elective		3
Humanities Elective	HUMN	3	CMPS Elective		3
Social Science elective		3	Arts Elective		3
Capstone Project I	CMPS 450	1			
Total		16	Total		14

In addition to fulfilling the department's educational mission, faculty engage in research and professional development that allows them to remain current in their fields to provide technological leadership to the university, community and the region. The department makes a conscious effort to evaluate and incorporate new areas and technologies into its programs.

LONI



The Department is currently supporting the projects of the Louisiana Optical Network Initiative, or LONI, in Computational Materials Science and

Computational Biomedical research. Our projects are funded by NASA, DOE, NSF, NIH, and Louisiana BOR. We have robotics, computational biomedical, and high performance computing (HPC) labs to facilitate our students and faculty to perform the state-of-the-art computational science study.

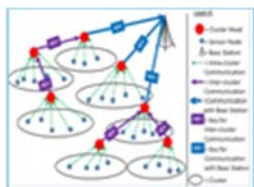
ROBOTICS



The robotics program is partially funded by Raytheon at the present time. Our robotics program involves one faculty members along with many

graduate and undergraduate students. Students engage in research, programming, testing and working hand-on with other Robotics Clubs. The Robotics laboratory is equipped with standard robots and robotic supporting facilities necessary to provide robotics training. The current research is to make an autonomous Humanoid Robot with face and voice recognition abilities.

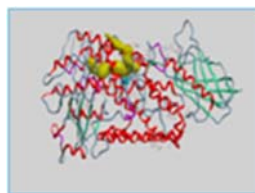
SENSOR NETWORK



Research is concentrated on the trustworthiness and reliability in distributed sensor networks using elliptic curve cryptography. We are focusing on the

development of optimization algorithm for number of cluster in a sensor networks and trust model for distributed systems.

BIOINFORMATICS



Our research focuses on modeling interactions between ligand and protein in lipoxygenase family using computational

approaches. We also develop and implement algorithms to improve molecular dynamics simulation. The long term goal of our research is to develop drugs for target proteins, which is important in biomedical research.

SOFTWARE ENGINEERING



Software Engineering lies at the heart of computer science. It integrates the diverse disciplines of theoretical computer science, problem-solving, and programming into a

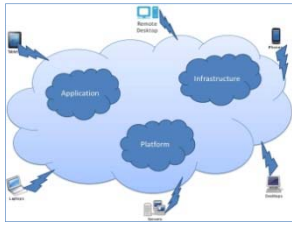
unique and highly rewarding branch of engineering. The department's program equips students with the ability to build realistic large-scale software systems, using the most advanced techniques and tools currently available.

HIGH PERFORMANCE COMPUTING (HPC)

In our Computational Material Science research, we are using state-of-the-art software packages along with our own molecular dynamics codes to design novel materials for high temperature, corrosive and oxidation environment applications, mainly modern turbines and engines. The screened candidates will be validated by experiments in Southern, LSU, and national labs. Recent studies include Cr-based alloys,

Nb-based alloys, oxide dispersion-strengthened alloys (ODS), and high entropy alloys. In our high performance computing (HPC) research, we are developing new molecular dynamics codes to simulate and design the real materials both efficiently and accurately. Students will have great opportunities to use HPC facilities in LONI to perform simulation.

CLOUD COMPUTING



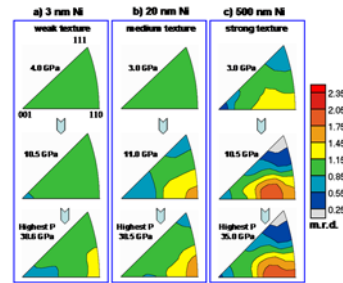
The Department currently conducts research in Cloud computing. Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). Research includes evaluation of various hypervisors such as KVM and VMWare. We are also implementing virtual machines and creating a Virtual Computing Lab using Apache VCL. The Cloud Computing program was funded by generous grant from IBM.

GAME PROGRAMMING



The Gaming program is a new area of research supported by the Computer Science Department. The area of gaming has grown rapidly over the past few years. We focus on both game playing strategies and game development. Our gaming program is currently headed by on faculty, involves several students and also includes a Gaming Club. We currently offer a Gaming Class and will also offer a concentration in gaming.

MATERIAL SCIENCE & ENGINEERING



After HPC materials design and simulation, we perform nano materials synthesizing and state-of-the-art characterization on high entropy alloys, non-precious metal catalyst for fuel cells, thermal barrier coatings, and sun screening nano materials using XRD, high pressure synchrotron XRD at LBNL, neutron scattering in-situ characterization at ORNL, SEM, TEM, Infrared-IR, and Raman spectroscopy. Students have opportunities to design and perform experiments locally and at national labs.



The Computer Science Department has excellent computing facilities. Located within the department are ten laboratories associated with instruction and research. In addition these major labs provide computer science major and faculty access to the Internet and the World Wide Web.

Computer Literacy Laboratory



There are twenty nine (29) HP TouchSmart all-in-one computers with 4 GB of RAM in this laboratory. The computers provide enhanced multi-application performance. All computers are networked and have internet access. One computer is for instructor which is connected to projector.

Microsoft Windows 7 professional is the operating system with Microsoft Office 2010 as the main packages.

This laboratory is used for courses CMPS 105 (Computer Literacy) and CMPS 290 (Microcomputer Applications in Business). The seating capacity for this laboratory is 30. These courses provide knowledge of the capabilities, limitations and implications of computer technology as well as an overview of the historical development of microcomputers in business. The focus is on application and use of operating system commands, word processing, spreadsheets, database managers, graphics, desktop publishing and presentation managers for business.

Architecture and Simulations Laboratory



This laboratory contains nine (9) HP TouchSmart all-in-one computers with 4GB of RAM and one IBM Laser Printer

Microsoft Windows 7 professional is the operating system. There are some software available in this laboratory such as Microsoft office 2010(Word, Excel, Access and Power Point), Dev C++, NetBeans IDE, WinSCP and putty (to access Linux/Unix system).

This laboratory is opened for all students (both graduate and undergraduate) to do some research and their class work



Solaris Laboratory

This laboratory consists of new twenty-six (26) Sun Ray clients which are ideal for displaying server-hosted virtual desktops. The desktops in this laboratory are networked and have internet access by way of two (2) Dell PowerConnect 2024 switches.

Graduate and undergraduate classes are held in this laboratory. Students write programs in C, C++, JAVA, and FORTRAN. This laboratory is used for instructional and programming purposes

Computer Programming Laboratory

This laboratory contains twenty seven (27) HP TouchSmart all-in-one computers with 4GB of RAM. One PC is an instructional computer connected to projector.

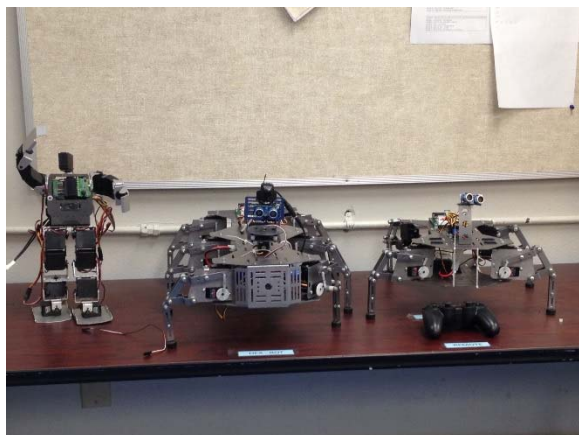
Microsoft Windows 7 professional is the operating system. There are some software available in this laboratory such as Microsoft office 2010(Word, Excel, Access and Power Point), Oracle 11g (for database class), Dev C++, NetBeans IDE, WinSCP and putty (to access Linux/Unix system).

This laboratory will be used for instruction and student use associated with the Software Engineering Option (planned). Both graduate and undergraduate classes will be held in this laboratory.

Server Network Monitoring Laboratory

This server room consists of one Dell PowerEdge 2400 Server which is a domain controller (Windows 2003), two (2) Sun Ultra 10 Servers (Solaris 9), one (1) for primary DNS Server, the other one is for the secondary DNS server. There is one new Sun Fire Server (Solaris 10) serves all the Sun Ray Clients in the lab 146. There are two (2) Dell Precision 330 Computers which are the departmental firewall. There is one Dell Optiplex GX520 as a Mail Server. There is one Dell PowerEdge 1850 Server (Windows 2003) that is used as a web server. The systems in the laboratory are networked and have internet access by way of two (2) 24 port Nortel 450-24T switches, two (2) Dell PowerConnect 2024 switches, two (2) Linksys SRW224G4 switches and one (1) 3COM 16 port 10/100 hub in this laboratory. This laboratory is used for network monitoring and network maintenance purposes. There are new server and SAN Storage used for faculty research (cron and biomed-storage). Also there is the virtual system that consists of two hosts, two giga-switches and one array storage that will be used for virtual machine servers.

Robotics Lab



It is partially funded by Raytheon and at the present time involves one faculty and several undergraduate students do the research, programming, testing, and works hands on with other Robotics Club students. The Robotics laboratory is equipped with standard robots and robotics supporting facilities necessary to provide robotics training. This laboratory has two QuadCrawler (4-legged) robots (Figure 1), one HexCrawler (6-legged) robot (figure 2) and Humanoid Robot (Human Eye) (figure 3). It is also equipped with a camera, sensors, Laptop, Tablet Pc, personal computers and some instruments.

The main object of this research is to make an autonomous robot which should

- be tall enough to reach and perform human activities
- be autonomous which means, it should be able to localize itself within a given environment and move autonomously on it, and all the computation and control must be performed onboard the robot.
- be able to interact with humans through voice commands
- be able to remember the person whom it met earlier using face recognition technology
- be able to climb stairs and pull itself up when fallen down
- be simple to control and light weighted.

Supercomputing Facilities

The following facilities are available at SU CMPS High Performance Computing (HPC) Lab for faculty and their students to use for the modeling test and mediate size job tests:

1) In the HPC Lab, there are three fast workstations for the modeling and preliminary code testing and a 32 TB JetStor 716F fiber connected storage for large biomedical data processing and saving. There are one HP9400 workstation with 4CPU and 8GB memory, one fast Windows XP workstation with 4 CPU and 64GB memory for fast visual processing and large-scale data communication. One extra SUN X4240 workstation with 8GB (updated to 32 GB) memory can perform fast optical network communications with bandwidth larger than 10GB. The Lab has purchased VASP, MedeA, CHARMM, AMBER, Wien2K, and some data processing packages for modeling and code testing. A HP Proliant 490c G7 blade server with 96 core and 10 GB fiber connection and a 40GB Dell Infiniband connected cluster with 32 nodes and 12 cores in each node are purchasing for high speed network, biomedical, and material modeling and HPC simulation.

2) Supercomputers: SU CMPS faculties are actively involved in using LONI supercomputers to perform HPC simulation to solve biomedical and materials front-end problems. Specifically, they are using Dell Linux clusters which have 128 nodes with 4 Intel Xeons cores, 10 GB infiniband switch, 1 GB Ethernet connection, with total 4.92 TF capabilities. The most powerful supercomputer, Queen Bee, is the core cluster of LONI (SU is one of the LONI six major research universities) and one of the Top 500 supercomputers in the world with 50.7 teraflops of capability. Queen Bee (queenbee.loni.org), has 668 nodes with 8 Intel Xeons cores @2.33GHz and 8 GB RAM 36 GB hard drive housed at the state's Information Systems Building (ISB) at downtown Baton Rouge. It has 10 GB infiniband switch, 1 GB Ethernet connection, and a 192 TB DDN Lustre storage. These computers are supported by a whole array of peripheral hardware and software including Ethernet connections and all major telecommunication optical networks. With this equipment, we are able to perform large scale calculations that require both large memory and CPU time.

Bio-Informatics Laboratory

There are one server (Dell PowerEdge T410) and four Workstations (3 Dell Vostro 220 and 1 MacPro) in this lab.

The current research focuses on modeling interactions between ligands and proteins, molecular dynamics simulation of enzymes, and algorithm development and improvement for molecular dynamics.

105. INTRODUCTION TO COMPUTER TECHNOLOGY (Credit, 3 Hours). This course will provide knowledge of the capabilities, limitations and implications of computer technology. Not for credit for Computer Science Majors.

190. PROGRAMMING TECHNIQUES AND ALGORITHM DEVELOPMENT I (Credit 3 Hours). This course is the first of a two-course sequence for Computer Science majors and minors. This is a rigorous course stressing a disciplined approach to problem solving, algorithm design, logic development, and testing and debugging of programs. This course will emphasize procedure and data abstraction, the detailed study of a programming language, and the evolution of computer hardware and software technologies. A current programming language will be used as a vehicle for expressing algorithms.

191. PROGRAMMING TECHNIQUES AND ALGORITHM DEVELOPMENT II (Credit, 3 Hours). The second course in the two-course sequence for Computer Science majors and minors improving the analysis and design skills is the primary intent of this course. Emphasis is placed on problem analysis and design of systems, algorithm design and efficient coding techniques to optimize overall programming execution. Advanced techniques utilizing the language introduced in CMPS 190. Prerequisite: CMPS 190.

200. DISCRETE STRUCTURES (Credit, 3 Hours). Mathematical foundations of Computer Science, including fundamentals of logic, set theory, Boolean algebra, graph theory and finite state machines. Prerequisite: Consent of Instructor.

201. DATA STRUCTURES (Credit, 3 Hours). This course is intended to present the data structures which may be used in computer storage to represent the information involved in solving problems (heaps,

hash tables, B-trees). Emphasis will be placed on concepts of data abstraction and its implementation. Also sorting and searching techniques including arrays. Prerequisite: CMPS 191.

240. PRACTICAL EXPERIENCE I. (Credit, 3 Hours). This course enables those students who enroll to gain firsthand experience while employing concepts and theory gained from elementary coursework in Computer Science. This experience is achieved by the student successfully completing an assignment in business, industry or government over a period of one semester. Prerequisites: Sophomore classification and approval of advisor.

250. BUSINESS APPLICATIONS WITH COBOL (Credit, 3 Hours) Facilities will be developed in computer program structures, data processing procedures, structures of data files and programming in a business language (COBOL). This course is designed for students of Computer Science as well as students matriculating in the College of Business. Prerequisite: CMPS 190.

270. C PROGRAMMING (Credit, 3 Hours) This course is designed to introduce students to the basic UNIX operating system structure and "C" programming-UNIX commands and application program, system formats will be taught, calls, . subroutines and file. The fundamentals of "C" programming will also be taught along with applications.

271. JAVA PROGRAMMING (Credit, 3 Hours) The fundamentals of Java Programming are taught in this course. The contrast between classical and object-oriented programming will be examined, with emphasis on the latter. The latest additions to the Java language specification will be additionally covered. A comparison between C++ and Java will also be discussed, to develop an appreciation of the rationale for the emergence of these two object-oriented languages.

285. SYSTEM ADMINISTRATION AND MAINTENANCE (Credit, 3 Hours). This course will discuss the following topics: PCs' hardware; troubleshooting, repairing, and maintaining; operating systems and software; networking;

security, and operational procedure. The theoretical and practical hands-on using the TestOut's LabSim gained in this course will prepare students to handle the most common and everyday PCs, networking, and security issues.

290. MICROCOMPUTER APPLICATIONS IN BUSINESS (Credit, 3 Hours). Overview of the historical development of microcomputers in business. The focus is on application and use of operating system commands, word-processing, spreadsheets database managers, and graphics, desktop publishing and presentation managers for business. Not for Credit for Computer Science Majors.

291. ADVANCED TECHNIQUES USING SPREADSHEETS (Credit, 3 Hours). This course consists of using a software package to enhance the business finance concepts such as financial amortization schedules, trend lines, forecasting, and integrating other software packages. Not for credit for Computer Science Majors.

300. PROGRAMMING LANGUAGES (Credit, 3 Hours). This course is intended to survey the significant features of existing programming languages with particular emphasis on underlying concepts abstracted from these languages. The structure of simple statements, the structure of algorithmic languages, list processing and string manipulation languages and including procedural, object-oriented, logic programming, and functional languages. Prerequisite: CMPS 201 and admission to the department.

301. BASIC ASSEMBLER LANGUAGE (Credit, 3 Hours). This course introduces the students to machine language structure and coding and provides a direct comprehensive description of the arithmetic, logical, branching, status switching, data representation and input-output operations, and the interrupt system. Structure of digital computers and linking to higher level languages. Prerequisite: CMPS 201 and CS major in the College of Sciences.

302. COMPUTER ORGANIZATION (Credit, 3 Hours). Understanding the behavior of elementary computer hardware. Content of course deals with two state

logic, flip flops, implementation of binary arithmetic, elementary Boolean algebra and elementary computer design. Addressing modes; implementation of a data path; interfacing processors and peripherals. Prerequisites: CMPS 191 and CMPS 200 and admission to the department.

305. SOCIAL NETWORKING (Credit, 3 Hours). This course introduces students to a variety of existing, new and emerging concepts, strategies, and technologies utilized in today's online environment. It covers various social networking platforms, content, and tools, and related security and privacy issues in social media. Students will learn how to use social media to reach personal and professional goals.

310. GAME PROGRAMMING (Credit, 3 Hours). This course introduces students to the design and implementation of video games. Topics include basic game artificial intelligence, storyboarding, graphics and animation programming and sound. This course will require significant programming. This course will be extremely hands-on with the goal of successfully implementing most of the material covered in the course. The final project of the course will be the implementation of a video game.

315. INFORMATION SYSTEMS (Credit, 3 Hours). This course is designed to explore the structure, classification, features, and methodologies of modern computer based information systems. The various aspects of data storage, data mining, and information retrieval, transaction processing and business analysis will be emphasized. This course is designed to complement Systems Analysis and Design. Prerequisite: Consent of Instructor.

318. COMPUTER ANIMATION (Credit, 3 Hours). This course introduces students to the design and implementation of animations. Both programming and utilization of animation software will be covered with an emphasis on the latter. Topics include the history of animation and computer animation, understanding elemental topics in physics and geometry related to 3D animation, and understanding 3D computer animation techniques and algorithms. This course will require the use 3D

rendering software such as Maya, Blender or Unity. This class will also cover the basics of animation programming using Java and OpenGL programming. This course will be extremely hands-on with the goal of successfully implementing most of the material covered in the course. The final project of the course will be the implementation of a computer animation projects .

334. DIGITAL DATA NETWORKS (Credit, 3 Hours).

This course will cover the standard topics in data communications and computer networks. Topics will include transmission media, analog and digital signals, analog-to-digital conversion, data transmissions, data encoding, effect of noise, error detection and correction, multiplexing, network topologies, standards and protocols, access methods and contention strategies, and data security. Laboratory exercises will be an integral part of this course. Prerequisite: CMPS 200 and CMPS 302 or Consent of Instructor.

335. WIRELESS SENSOR NETWORKS (Credit, 3

Hours). This course will cover the principles of wireless sensor networks protocols and basic of security issues. The focus will be given to the following topics: hardware architecture of sensor mote, memory management, power management. Students will learn various attacks and their solutions, applications of sensor networks, and advanced topics.

340. PRACTICAL EXPERIENCE II (Credit, 3 Hours).

This course to gain firsthand experience enables those students who enroll while employing concepts and theory gained from intermediate coursework in Computer Science. This experience is achieved by the student successfully completing an assignment in business, industry or government over a period of one semester. Prerequisites: Junior classification and approval of advisor.

350. WEB-BASED PROGRAMMING (Credit, 3 Hours).

This course will give the student the skills necessary to develop WWW applications from client/server architecture. Topic includes history and evolution of HTML; CGI, ActiveX, JavaScript, Perl, and Java Server

Pages; securing Web applications, and other web programming options will be presented. Students will work on a team project to develop Web-based solutions to business problems. Prerequisites: CMPS 300 or Consent of Instructor.

360. SCIENTIFIC PROGRAMMING (Credit, 3 Hours).

Specialized languages and tools for vector and parallel computation will be introduced. Facility will be developed in computer design program structures, problem definition and analysis, program design, algorithmic techniques and programming in a scientific language. Parallel approaches to matrix computations using such tools as high performance FORTRAN and message passing interface. Designed for those students who are interested in applications to computationally intensive problems in science and engineering. Prerequisites: CMPS 191, MATH 264, and admission to the department.

365. COMPUTERS, INFORMATION AND SOCIETY

(Credit, 3 Hours). This course will cover the policies, legal issues and legislation, professional responsibilities and ethical issues in the discipline of Computer Science. Topics will include, but will not be limited to intellectual property, security and privacy, ethics, and Internet protocol. Prerequisites: CMPS 334 and admission to the department.

370. OBJECT-ORIENTED PROGRAMMING (Credit, 3

Hours). This course will introduce the student to the concepts underlying object-oriented programming. It reviews pointers, procedures and structures in C. It introduces the concept of classes and objects for problem analysis, design and solution. It covers the ANSI standard of C++, syntax and implementation aspects with a wide range of class definitions and object manipulations. Some commercially available C++ program developments will also be discussed. Prerequisites: CMPS 201 and admission to the department.

371. ADVANCED OBJECT-ORIENTED PROGRAMMING (Credit, 3 Hours).

This is an advanced course in object-oriented programming with JAVA and more intense than 370. Topic includes but not limited to: sub-typing, interfaces and

abstract classes, overloading and overriding, multiple and repeated inheritance, polymorphic methods, dynamic binding, genericity, parametric polymorphism, message-passing, threads, remote method invocation, and automatic memory management. Prerequisite: CMPS 370 and admission to the department.

372. CLOUD COMPUTING (Credit, 3 Hours). This course introduces students to the design and implementation of cloud computing solutions. Topics include virtualization, public and private clouds, use of cloud computing resources, data centers, different cloud computing models, cloud computing storage solutions, security in cloud computing and IBM's Smart Cloud Computing. This course will also investigate motivating factors, benefits, challenges, Enterprise Software as a service and other service models of cloud computer. This course will be extremely hands-on with the goal of successfully using or implementing most of the material covered in the course. This course will investigate cloud computing solutions such as Google App Engine and Amazon EC2 and virtualization technologies such as Xen and VMWare. The final project of the course will be the implementation of a cloud computing solution.

375. INFORMATION SECURITY (Credit, 3 Hours). This course introduces the students to methods of securing cyberspace is an extraordinarily difficult strategic challenge. Topics include, but not limited to: formal specification and verification of security properties, operating system security, trust management, multi-level security, security labeling, security auditing and intrusion detection, security policy, safeguards and countermeasures, risk mitigation, covert channels, identification and authentication, password schemes, access control lists, and data fusion techniques. Prerequisites: CMPS 334 and admission to the department.

378. SOFTWARE ENGINEERING (Credit, 3 Hours) The study of the software life-cycle that different applications go through, from conception to release and maintenance. Topics include, but are not limited to software requirements, software design, critical

software systems, software verification and validation, software management, legacy systems, risk management; tool support; software process; discussion of CMM and ISO-9003. Students will be required to develop a large project in team setting. Prerequisite: CMPS 201 and admission to the department.

387. OBJECT-ORIENTED DESIGN PATTERNS (Credit, 3 Hours). Advanced object-oriented design and implementation based on design patterns. Theoretical framework for the basis of design pattern classification into creational, structural, and behavioral patterns; application of specific patterns (Abstract Factory, Builder, Factory Method, Adapter, Composite, Decorator, Proxy; Iterator, State, Strategy, and Template Method) to the design of software applications, to be implemented in one or more object-oriented languages. Prerequisites: CMPS 370 and admission to the department.

388. HUMAN-COMPUTER INTERACTION (Credit, 3 Hours). Introduction to the principles of Human-Computer Interaction in interface design of standalone and web-based applications. The course includes discussion on psychological, physiological, cognitive, cultural, ergonomic, and design issues in computer usage. Various design and implementation methodologies will be examined and contrasted, and applied in applications to be developed as coursework. The course will be project-driven and students will work on various team projects, and conduct testing on aspects of learning and usage of their software.

390. DATABASE PROGRAMMING (Credit, 3 Hours). This course covers the principles of database programming and relational databases using a case-based, problem-solving approach. The focus will be Microsoft Access and Structured Query Language. The use of tables, queries, forms, reports, advanced queries, embedded SQL, dynamic SQL and ODBC interfaces will be covered. Students will learn the essentials to develop database applications and data manipulation and gain the skills they need to begin designing, creating, and maintaining databases. This

is done through textbook, lectures, labs, lab assignments and projects. Prerequisites: CMPS 201.

400. OPERATING SYSTEMS (Credit, 3 Hours). This course is intended to bring the student to grips with the actual programs encountered in systems programming. Operating system principles, hardware/software interface, resource management, segmentation, paging, virtual memory; operating characteristics, user service and their limitations will be given. Overall structure of multiprogramming systems on multiprocessor hardware configurations will be treated, as well as details on addressing techniques, core management, and file system design and management. Prerequisite: CMPS 302 and admission to the department.

402. COMPUTER ARCHITECTURE (Credit, 3 Hours). An overview of computer systems, data representation, memory hierarchies and storage, input/output, addressing stack architecture, pipeline architecture, microprogramming, basics of pipelines and multiprocessors, and performance evaluation. Prerequisite: CMPS 302 or consent of the instructor.

404. COMPILER CONSTRUCTION (Credit, 3 Hours). This course will emphasize the techniques involved in the analysis of efficient object code; and ultimate aim is to have each student design a simple but complete compiler. Organization of a compiler including compile-time and run-time symbol tables, lexical scan, object-code generation, error diagnostics, compiler language and overall design will be covered. Prerequisite: CMPS 300 and CMPS 400.

407. NUMERICAL METHODS (Credit, 3 Hours). This course is designed to give a strong working knowledge in applying numerical methods to solve problems. Topics include various methods to approximate desired number, which may be a root, an integral, or a value of a function in a differential equation. All of the methods studied have numerous practical applications in science and engineering. Prerequisite: MATH 265 and admission to the department.

412. THEORY OF COMPUTING (Credit, 3 Hours). Topics covered will be grammars, languages and productions, automata and their languages, regular sets, Turing machines and recursive functions, effective numbering and universal machines. Prerequisite: CMPS 200 and admission to the department.

415. SYSTEMS ANALYSIS AND DESIGN (Credit, 3 Hours). Provides the student with tools and techniques used in analyzing manual or automated information systems with a view toward computer implementation of these systems in terms of accuracy and efficiency. Analysis, design, and implementation phases of software systems development using a phased life cycle approach; modeling tools and CASE software. A team approach to software development and project management. Prerequisite: CMPS 201, CMPS 302, or consent of the instructor.

420. DATABASE MANAGEMENT SYSTEMS (Credit, 3 Hours). Topics include basic file organization: data structures, schemas, and subschemas, data models, relational, hierarchical, and network models, database reliability, database integrity, database protection, review of commercial database systems, programming in a database environment, and database administrator's role. Prerequisite: CMPS 201 and CMPS 300.

425. ROBOTICS (Credit, 3 Hours). This course introduces fundamental concepts in Robotics. Basic concepts will be discussed including coordinate transformations, sensors, path planning, kinematics, feedback and feed forward control, stressing the importance of integrating sensors, effectors and control. The last part of the course will focus on applying the knowledge from the initial lectures to the key approaches to mobile robot control (reactive, behavior-based, and hybrid), and briefly discuss robot learning and multi-robot systems. In the lab, robot kits will be used in weekly exercises illustrating lecture material; the last month of the lab will be spent in applying the learned material to a final project, in which the students will design and build a robot for a final competition. This course is intended for undergraduate

students with interests in Robotics, Visual Computing, and Artificial Intelligence.

433. TELECOMMUNICATIONS (Credit, 3 Hours). Topics include communications environment, communications system components, networks and control common carriers, design of communications networks, and local area data networks. Design preparation and delivery of information, applications, and services using client/server computing over a wide-area network. Prerequisite: CMPS 334.

435. INTRODUCTION TO NEURAL NETWORKS (Credit, 3 Hours). Neural networks represent an emerging technology, and are becoming increasingly versatile. They are able to solve difficult nonlinear problems that are solvable using traditional methods. Inherently parallel design and ability to interact with the environment make neural networks ideal for large applications. This course will consider the design and implementation of neural networks. Topics include neural networks as problem solving tools; neural networks as self-organizing systems; single or multi-layered perceptions; associative memory networks; techniques in neural learning, back-propagation, supervised and unsupervised learning. Issues related to neuro-computing hardware and neuro-VLSI implementation will be discussed. Prerequisite: Departmental Permission Only.

436. PARALLEL COMPUTING AND APPLICATION (Credit, 3 Hours). This course covers parallel programming paradigms, examining core concepts, focusing on a subset of widely used contemporary parallel programming models, and providing application in materials design, and biomedical research. Topics include parallel programming principles, Dell Linux cluster, GPU and CUDA, performance tune up of parallel codes in material science and biomedical research, and result data analysis and processing. Applications are drawn from diverse areas of science and engineering

440. PRACTICAL EXPERIENCE III (Credit, 3 Hours). This course enables those students who enroll to

gain firsthand experience while employing concepts and theory gained from advanced course work in computer science. This experience is achieved by the student successfully completing an assignment in business, industry, or government over a period of one semester. Prerequisite: Senior classification and approval of advisor.

450. CAPSTONE PROJECT PHASE I. (Credit, 1 Hours). Provide the opportunity for students to demonstrate that they have achieved the goals for learning established by the University and the Department. The course is designed to assess cognitive, effective, and psychomotor learning, and to do so in a student-centered and directed manner which requires the command, analysis, and synthesis of knowledge and skills. The capstone course described here integrates learning from courses in the major with the courses from the rest of the academic experience. It requires the application of that learning to a project which serves as an instrument of evaluation. The course fosters interdisciplinary partnerships among university departments and helps cultivate industry alliances and cooperation. **Prerequisite:** student must be a senior having completed all the requirements of the three years in Computer Science.

451. CAPSTONE PROJECT PHASE II. (Credit, 2 Hours). Provide the opportunity for students to demonstrate that they have achieved the goals for learning established by the University and the Department. The course is designed to assess cognitive, effective, and psychomotor learning, and to do so in a student-centered and directed manner which requires the command, analysis, and synthesis of knowledge and skills. The capstone course described here integrates learning from courses in the major with the courses from the rest of the academic experience. It requires the application of that learning to a project which serves as an instrument of evaluation. The course fosters interdisciplinary partnerships among university departments and helps cultivate industry alliances and cooperation. **Prerequisite:** student must be a senior in his/her second semester in

Computer Science and have completed CMPS 450 with a grade of C or better.

455. SPECIAL PROJECTS (Credit, 3 Hours). Independent project implemented under the guidance of a member of the Computer Science faculty. Prerequisite: Departmental Permission Only.

470. COMPUTER GRAPHICS (Credit, 3 Hours). Algorithms, analysis, and software architecture for graphical information systems are covered; mathematics and algorithms for generating pictures and storing representations of pictures; calculus and linear algebra are used and modeling of solids is introduced. Prerequisites: MATH 233 (Credit or enrolled), MATH 265 and mastery of a computer language.

480. ARTIFICIAL INTELLIGENCE (Credit, 3 Hours). Fundamental concepts of artificial intelligence and its various and changing technologies, including: expert systems, natural language processing, computer perception and robotics, intelligent computer-assisted instruction. Students will design and implement a semester project using development tools existing in the Department of Computer Science. Prerequisite: Consent of Instructor.