ABET
Self-Study Report

for the

Computer Science Program

at

Alabama A & M University

4900 Meridian Street,
Normal, AL 35762

June 29, 2016

CONFIDENTIAL

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BACKGROUND INFORMATION

A. Contact Information

The direct contact personnel for ABET accreditation at AAMU for CS program are: Dr. Kaveh Heidary and Dr. Joel Fu. Their contact information are listed here.

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B. Program History

The Computer Science Program at Alabama A&M University is the oldest in the State of Alabama and one of the oldest in the nation. It has been serving the community, state and nation since 1968.

Major changes in the Program include:

1. Departments of Computer Science and Electrical Engineering were merged to form Department of Electrical Engineering and Computer Science in 2011.

2. Started offering the Cybersecurity Concentration as part of the Bachelor of Science in Computer Science degree program in 2014.

3. Employed one full-time non tenure-track faculty member in 2015.

4. Started offering the 4+1 accelerated combined BS+MS degree program in 2015.

5. Adopted 6 new courses in the areas of Discrete Structures (CS203, 2012), Advanced Programming (CS314, 2012), Object Oriented Design (CS328, 2012), Operating System (CS405, 2012) and Cyber Security (CS386, 2014).

The BS Program in Computer Science was evaluated by ABET in 2010 and underwent a focused visit in 2012, and submitted the Interim Report in 2014.

C. Options

Students are allowed one of two options for a computer science degree; a general computer science degree and a computer science degree with the Cyber Security concentration, which was started in 2014. A student may select any two 300-level and any two 400-level computer science electives for the general computer science degree. The students that select the Cyber Security concentration must replacing the two 300-level and the two 400-level general electives with two 300-level cyber security electives and two 400-level cyber security electives. In addition, students in each option are allowed to take two free electives.

D. Program Delivery Modes

Courses in the program are taught during both day and evening hours. The delivery mode is traditional lecture/laboratory.

E. Program Locations

All computer science courses are offered on the main campus of Alabama A & M University.

F. Public Disclosure

AAMU CS Program Education Objectives (PEOs), Student Outcomes (SOs), annual student enrollment and graduation data are posted online at

http://www.aamu.edu/Academics/engineering-technology/EE/Pages/Program-in-Computer-Science.aspx

The CS Program Education Objectives (PEOs) and Student Outcomes (SOs) are also published in the AAM Undergraduate Bulletin.

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

The Computer Science Program at AAMU underwent ABET program evaluation in 2014. The final statement dated August 5, 2015 from ABET identified two concerns in the Computer Science Program. The concerns are listed below along with a brief description of the actions taken.

Criterion 7. Facilities: The library does not provide access to either the ACM or IEEE digital libraries for students. Funding for such resources is still minimal. The potential exists that students may not have adequate access to library services needed to support their scholarly activities.

Response/Actions. The AAMU library now has access to both the ACM and IEEE online digital libraries. These online digital libraries, as well as numerous other scientific digital libraries, are provided by EBSCO and Science Direct. The access to EBSCO and Science Direct, at a cost of $10,384.43 and $350,082.16 respectively, demonstrates the library as well as the university commitment to the computer science program. The following is a direct link to the ACM online journals provided by the library https://aamu.on.worldcat.org/external-search?queryString=acm.

The library has, through its eBrary and Springer collections, sufficient ebook holdings to compliment the print holdings. The liaison librarians reach out to the teaching faculty each semester for recommendations to purchase journals, databases and books. Approximately, $3,500.00 is allocated each fiscal year to sustain the print (book) resources in the computer science program. An addition amount of $3,500 is allocated to any department for the year if the program is undergoing an accreditation process.

Criterion 8. Support: One new faculty member may join the program fall 2014 but the search for a second faculty member has not yet been resolved. Due to overall budget uncertainty, the potential exists that the program will not be able to continue lab equipment upgrades or attract qualified faculty members.

Response/Actions. The computer science program has a commitment from the university to hire two new faculty members. The department has made numerous search efforts to find qualitied candidates with Ph.Ds in computer science. The department and the search committee have reviewed over 50 applications and have had face-to-face interviews with nine candidates. Unfortunately, none of the candidates has meet met the criterial that the department and the Dean of the school are seeking in terms of experiences, teaching, and research.

To increase and enhance the pool of qualified candidates, the university has made the commitment to two current university employees to support them in pursue of a terminal degree in computer science. Both are long-time employees of the university and both have Master of

Computer Science degrees. Both employees are teaching three computer science courses each semester and both have agreed to a three year teaching commitment at AAMU after receiving their Ph.D. We expect one employee to receive his Ph. D by August 2016 or December 2016 at the latest and the second employee has about three years to go to complete her degree.

One criterial the Dean of the school is searching for is a Ph.D candidate with strong cyber security credentials. To help attract that candidate, the department has established a new Cyber Security Lab. The lab is in Room 253 and contains 10 computers total: five regular PC computers running Microsoft Windows operating software and five Apple desktop computers running Apple operating system software. This lab also contains a complete cybersecurity setup, which include one router, two servers, and two switches, all mounted in a rollable rackmount cabinet.

During the last two years, the computer science program has replaced the 99 computers in its three labs with new computers. The latest operating system software is also installed on the computers, such as Microsoft Windows 8 and Windows 10, as well as Ubuntu version 13 LINUX and Microsoft Office 2013. Each lab is also equipped with video projects as well as a high speed printer.

The department has a line-item in its budget for approximately $20,000 computer equipment upgrades for the university Title III program each year.

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

A. 1. Admission Directly from High School

Students entering the BSCS program must meet all the requirements established by the University. University admission is designed to accommodate students with diverse backgrounds and educational goals. For unconditional admission high school graduates must have earned a score of 18 ACT/equivalent SAT and maintained a grade point average of "C" in the following subjects: English, mathematics, science, and history and political science. In addition, the entrance requirements in mathematics are three and one-half units; algebra, two units; plane geometry, one unit; and trigonometry and/or advanced mathematics, one-half unit. Students must have at least two units in science: chemistry, one unit; and physics, one unit.

A.2. Admission Through the University College

Prior to entering the Computer Science program, a student must complete all the requirements of the University College. In addition, students must have maintained a minimum overall grade point average of 2.5/4.0 and completed at least the first course of a calculus with a grade of "C" or better.

A.3 Transfers from Other Institutions

Students desiring to transfer to the program must be in good academic standing at the college or university from which they are transferring. In addition, they must have maintained a grade point average of 2.5/4.0 or better, completed at least the first course of calculus with a grade of "C" or better, and completed the requirements of the University College at Alabama A&M University, if they transfer in fewer than 30 semester hours.

B. Evaluating Student Performance

Students are advised, instructed, monitored, mentored and evaluated by the CS faculty of the Department of Electrical Engineering and Computer Science. Beginning in the freshman year, students are assigned an advisor in the University College and a co-advisor in the CS Program. In general, freshmen begin to seek advice from their CS co-advisor by the middle of their first semester. The co-advisors for the CS Program of the Department of Electrical Engineering and Computer Science start a folder for each student as they pre-register for the spring semester. By the end of the spring semester the co-advisors are familiar with most

freshman that plan to enter Computer Science. The initial evaluation of entering students by the CS Program is based on mathematics placement by University College and student performance in CS104. CS 104, Introduction to Computers & Ethics, and CS 102, Introduction to Programming I, are the only required CS freshman-level courses in the BSCS degree program.

In CS 104 fundamental concepts in computers are introduced. Practical application software concepts are introduced and utilized. These fundamental concepts include a review of the computers evolution, basic operations and life cycle, the computer system-hardware devices and software. The practical concepts include hands on assignments using most MS Office applications. Computer Ethics concepts and societal effects of computers are also introduced, which include computer privacy, computer crimes and computer security. Students are required to develop related projects which will sharpen their communication skills through the presentation of projects and research of topics in the computer ethics, crime and privacy subjects. Performance in this course provides a baseline for assessment of student strengths and weaknesses and the information required for initial department advisement activity.

All CS Faculty maintain regular office hours, and most have an open door policy. Students are encouraged and given every opportunity to consult with their CS advisors and course/laboratory instructors on a regular basis. During the course of the semester, the performance of students in all CS courses and laboratories are evaluated on a continuous basis through various modalities including homework assignments, short quizzes, exams, project reports and class discussions. Instructors provide feedback to students and make them aware of their performance on a regular basis, and offer recommendations for improvement.

Students' registration is handled online through the Banner registration system. The system requires the student to enter the unique PIN number in order to register. The student PIN number is valid only for one semester and can be assigned only by an academic advisor. A student, therefore, cannot proceed with the registration process without consultation with an academic advisor every semester. The advisor checks student's academic record and program of study, and advises the student accordingly and recommends appropriate courses to be taken.

The Banner system does not allow students to register for courses unless all prerequisites are met. Under special circumstances a student may be granted permission to register for a course for which prerequisites have not been met. To do this, a special waiver form has to be filled out and signed by the Program Coordinator, the Department Chairperson and the College Dean, and the registration for that course has to be done manually at the Department Office. The Coordinator signs the form after consultation with the course instructor and the student advisor, and establishing that the student, although missing the prerequisite, has the necessary academic preparation to handle the course.

C. Transfer Students and Transfer Courses

As noted above, students desiring to transfer to the CS program at AAMU must be in good academic standing at the college or university from which they are transferring. In addition, they must have maintained a grade point average of 2.5 or better, completed at least the first course of calculus with a grade of "C" or better, and completed the requirements of the University College at Alabama A&M University, if they transfer in fewer than 30 semester hours.

As a public institution, Alabama A&M University must adhere to STARS, the Statewide Transfer & Articulation Reporting System for public colleges and universities in Alabama. A student transferring from an Alabama two-year college may choose to fulfill the degree requirements of the AAMU Bulletin which was in effect at the time of the student's initial enrollment at the Alabama two-year institution, provided that the time lapse between attending the two-year institution and AAMU enrollment is not more than one year. Students intending to transfer to AAMU are encouraged to consult with their advisors and obtain a STARS guide at http://stars.troy.edu/what_is_stars.html. The STARS System allows public two-year students in Alabama to obtain a Transfer Guide/Agreement for the major of their choice. This guide/agreement, if used correctly, guides the student through their first two years of coursework and minimizes loss of credit hours upon transfer to the appropriate four-year university in Alabama.

Following admission to AAMU, the transfer student must report to a CS advisor. The advisor reviews the student's academic transcript and the official course descriptions and syllabi published by the student's previous school. Only courses whose contents substantially overlap those of the CS curriculum are accepted toward the BSCS degree at AAMU. The CS advisor then completes a course substitution form, listing each transferred course for which an AAMU equivalent is identified. This form is then signed by the student, CS advisor, Department Chairperson, the College Dean, and registrar, and becomes part of the student's academic record. The student is then advised to take the appropriate sequence of courses at AAMU.

D. Advising and Career Guidance

Academic advisement is provided to every student on a per semester basis in order to help students make satisfactory progress toward their degrees. Academic advisement for newly admitted and undecided freshmen is provided through the University admissions office and University College. Upon selection of CS as a major, students are directed to the CS faculty for advisement. All freshmen take two one-credit hour courses, First Year Experience for University Life, where they are introduced to the University academic policies and procedures including financial aid and money management. Students are taught skills that will help them better transition to college life, including career exploration, good study habits, time management and test-taking skills.

Students have ample opportunity to obtain career related advice from the office of Career Development Services (CDS). Career Development Services' mission is a commitment to assist students and alumni in realizing career objectives, prepare for employment opportunities, and provide career planning services that will enable students to move confidently from the academic environment to the world of work. Each year, on multiple and regularly scheduled occasions, the CDS provides opportunities for employers and students to meet on campus at career fairs. Company representatives, from across the nation, attend these gatherings, display information and are available to speak with interested students about their company's employment opportunities. CDS also

sponsors Interview Days, where employers conduct on-campus interviews with students for cooperative education or internship positions as well as permanent positions for graduating seniors.

One of the highlights of the year for students at Alabama A&M University is the visit of the Youth Motivation Task Force (YMTF). Twice each year, many AAMU alumni who are successful professionals at corporations across the country, converge on campus for two day periods in the fall and spring semesters and visit classrooms answering students' questions about various career related topics including life as a professional and potential career paths. Each year multiple groups of CS alumni who have productive careers in industry and government come back to campus and share their experiences with our students during class periods. During evening social hours students have the opportunity to talk with and solicit advice from these professionals. Many CS students have obtained internship appointments and employment after graduation as the result of contacts initiated through YMTF.

CS faculty, and the Dean's Office of the College of Engineering, Technology and Physical Sciences, actively solicits and reviews internship and employment opportunities for CS students, and advise students accordingly. The College and the Program maintain bulletin boards, where opportunities for internship, permanent employment and graduate studies are posted. CS faculty members regularly provide recommendation letters for deserving students applying to graduate and professional schools.

Faculty of the CS program makes concerted efforts to involve undergraduate CS students in their research projects as undergraduate research assistants. These activities include working with students on cutting-edge research projects at laboratories both on and off campus. Some graduates of the program have chosen to purse graduate studies and professional career tracks in technical areas which are directly related to their experience as undergraduate research assistants.

E. Work in Lieu of Courses

The University awards three (3) semester credit hours in each area to students who score three (3) on the Advanced Placement Examination in the areas of Biology, Chemistry, English, Foreign Languages, History, Mathematics, Physics, Art and Music. Students scoring 4 or 5 may be awarded additional credit upon the recommendation of the appropriate department chairperson.

The CS program does not award any course credit for life experience, military experience, and test out. Under special circumstances up to three (3) CS credit hours are awarded for pre-approved internship or Co-Op work conducted through the University Cooperative Work Experience (CWE) program. In order to receive academic credit for work a Co-OP student is required to enroll in a CWE course each Co-OP assignment and will receive 3 Credit-hours per term. Grades are determined by the supervisor's evaluation, student report and student evaluation in addition to the co-op coordinators evaluation of the students over progress along with due dates. The credit is accomplished by substitution of the three (3) hours of CWE coursework for an appropriate three (3) credit hours CS course, typically an elective (e.g. CS 3XX or 4XX). To obtain approval to take CS 484 Internship, the student should present to the CS program coordinator a Letter of Appointment detailing the proposed activities and expected results. Following completion of the work period, the student should submit formal monthly reports. The supervisor at the company where the intern works will submit mid-term performance and final performance reviews. The CS coordinator will give the student a final grade based on the monthly reports and performance reviews.

Dual enrollment is treated similarly to transfer credit as explained in Criterion 1.C above.

F. Graduation Requirements

The name of the degree awarded is Bachelor of Science in Computer Science.

The degree of Bachelor of Science in Computer Science (BSCS) is offered in two concentrations: General, and Cyber Security.

In order to obtain the BSCS degree, the students must complete one of two curricular tracks published in the University Bulletin. The curriculum of each one of the BSCS concentrations is comprised of 129 credit hours.

The 129 credit hours comprising the BSCS curriculum include: Seventeen credit hours of mathematics including discrete structures (CS203); eight credit hours of calculus based physics, including laboratory; four credit hours of biology/chemistry, including laboratory; nine credit hours of English; six credit hours of history; three credit hours of economics; and six credit hours of humanities and fine arts; three credit hours of social sciences. Other requirements are two credit hours of first year experience and two credit hours of health or physical education. All CS students must take at least 63 credit hours of required core CS courses including a nine credit hour course in basic programming (CS102, 109, and 206), a three credit hour course in digital logic design (CS209), and the capstone design, Senior Problem Project, comprising of a two-course sequence of six credit hours (CS401, 403).

All CS students must consult with their academic advisors prior to registration every semester. The CS advisor reviews the student's academic record and makes recommendations about the appropriate course to be taken each semester. Each rising senior in the CS Program, in consultation with the CS advisor, must complete the Senior Record Check Form prior to registration. If the student has transfer credits, the completed Transfer Credit Form is attached to the Senior Record Check Form. The form is signed by the student, advisor, Coordinator, Chairperson, and is forwarded to the Engineering and Technology Academic Coordinator for final check and approval. The student is made aware of all the remaining courses s/he needs to complete in order to receive the BSCS degree.

G. Transcripts of Recent Graduates

The CS Program will provide transcripts from some of the most recent graduates to the visiting team, as requested, along with any needed explanation of how the transcripts are to be interpreted.

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

A. 1. University Mission Statement

Alabama Agricultural and Mechanical University reflects the uniqueness of the traditional land-grant institution combining teaching, research, service, liberal arts, and vocational fields. The University offers baccalaureate, masters, and doctoral level degrees (that are compatible with the times) to all qualified and capable individuals who are interested in further developing their technical, scientific, professional, and scholastic skills and competencies. The University operates in the three-fold function of teaching, research, extension and other public service. Alabama A&M University, a center for excellence, provides an educational environment for the emergence of scholars, scientists, leaders, critical thinkers, and other contributors to a global society. In cooperation with business, industry, governmental agencies, and other private and community-based institutions, Alabama A&M University provides a laboratory where theory is put into practice globally. Further, the University is committed to:

1. Excellence in education and the creation of a scholarly environment in which inquiring and discriminating minds may be nourished;

2. Education of students for effective participation in local, state, regional, national, and international societies;

3. Search for new knowledge through research and its applications;

4. Provision of a comprehensive outreach program designed to meet the changing needs of the larger community;

5. Programs necessary to address adequately the major needs and problems of capable students who have experienced limited access to education, and

6. Integration of state-of-the-art technology into all aspects of University functions.

In cooperation with businesses, industry, governmental agencies, and other private and community-based institutions, Alabama A&M University provides a laboratory where theory is put into practice, in a productive environment.

A. 2. College of Engineering, Technology and Physical Sciences Mission Statement

The mission of the College of Engineering, Technology and Physical Sciences is integrated within and fully supports the mission of the Alabama A&M University. The mission of the College of Engineering, Technology and Physical Sciences is to provide the educational settings that allow well-prepared and dedicated students the opportunity to become educated

in the sciences, engineering disciplines, and related competencies so that they may become professional practitioners of engineering and engineering technologies in those fields offered by Alabama A&M University. Upon completion of the program chosen, students will be sufficiently prepared to become productive professionals in the industrial, governmental or military sector, or, if they so desire, they will be eminently prepared to enter graduate school.

A. 3 Department of Electrical Engineering and Computer Science Mission Statement

The mission of the CS Program at Alabama A&M University, consistent with that of the University and the College of Engineering, Technology and Physical Sciences is to provide quality education, research, and service to its constituents. The Program commits to provide qualified graduates in the growing field of computer science by fostering:

1. Excellence in computer science education
2. Physical facilities and learning resources that are conducive to learning, research, extension and development
3. A sense of scholarship, leadership and service
4. A search for new knowledge through research and its application
5. Programs necessary to address the needs of capable students

B. Program Educational Objectives

The Department fully considers the mission of the Institution, the College of Engineering, Technology and Physical Sciences and input from the University administration, EECS Program Advisory Board, and other constituents in developing the CS Program Educational Objectives (PEOs). The program educational objectives are consistent with the University's mission and the ABET criteria.

The Program Educational Objectives, on the basis of which the currently utilized program assessment processes, performance metrics and evaluation procedures are developed and implemented, are listed below in Table 1. Thus, This Self Study Report was compiled using the PEOs of Table 1 as the performance yardstick. These PEOs are listed in the AAMU Undergraduate Bulletin, the AAMU website at

http://www.aamu.edu/administrativeoffices/academicaffairs/Documents/Bulletins/Bulletin_2015-2016.pdf, and the CS program website at

http://www.aamu.edu/Academics/engineering-technology/EE/Pages/Program-in-Computer-Science.aspx

Table 1. Program Educational Objectives

1. Graduates will work in careers in computing and associated technology fields.
2. Graduates will practice their professional endeavors, communicating effectively, as team members, in leadership positions to the highest legal and ethical standards.
3. Graduates will realize, mentor, and pursue a program of continuous educational improvement for the benefit of themselves and others in our dynamic and rapidly changing field.

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The educational objectives of the CS Program are fully consistent with the mission of Alabama Agricultural and Mechanical University. Program educational objective (PEO) # 1 directly addresses University Mission Statements (UMS) # 2, 3, 4 and 6. PEO # 2 directly addresses UMS # 1, 2, and 4. PEO # 3 addresses UMS # 1, 3 and 5.

D. Program Constituencies

The main constituents of the AAMU Computer Science Program are the State of Alabama, local and national corporations and federal governmental agencies, primarily in the security, defense, aerospace and power generation fields, and the State of Alabama. Additional constituents of the program are: University administration, various other employers of our graduates, department faculty, alumni, current students and their parents.

North Alabama and the City of Huntsville in particular, are fortunate to have a thriving engineering community, which relies heavily on the Department of Defense, NASA and the Tennessee Valley Authority (TVA). Huntsville is home to the Redstone Arsenal, which hosts a number of US Army and DoD engineering and research centers, including; the Army Material Command, the Missile Defense Agency and the Army Aviation and Missile Research Development and Engineering Center, among others. Furthermore, Huntsville is also home to the NASA – Marshall Space Flight Center, which hosts much of the work for the International Space Station, and is the lead center for the recently funded development of new heavy lift rocket systems and the Space Launch System (SLS). TVA is also a significant economic engine in the region with a number of power generating facilities in the North Alabama area, including several hydroelectric and six coal-fired plants, and a large nuclear station within an hour commute from the campus – the operational Brown's Ferry plant. Graduates of the AAMU BSCS Program are highly sought by many of these entities in the

immediate area, and by many other employers throughout the Southeast region and the Nation.

To the extent possible, representatives from these various constituents are included as members of the program Advisory Board. Table 2 lists the present membership and affiliation of the Electrical Engineering and Computer Science Advisory Board. The membership of the Board is diversified and represents the constituency of the program. The board deals directly with issues of concern to the Computer Science Program including issues associated with both ABET and SACS (Southern Association of Colleges and Schools) accreditation. The Board is also involved with the ABET accreditation process, serving as a "Red Team" for review of the Self-Study Report. The full EECS Advisory Board normally meets on a semester basis, and Board sub-committees meet as needed. Advisory Board meetings follow a detailed schedule and dedicate a portion of each meeting to providing systematic process. The CS Program, through inputs from its Advisory Board, alumni, students, faculty, industry and governments entities not represented in the Advisory Board, accreditation bodies, professional societies, and University administration, strives to best tailor its educational objectives to the constituents' needs.

Table 2. Electrical Engineering and Computer Science Advisory Membership

Member Name	Affiliation	Phone	Email
Dr. Ray Watson, Chairperson	RCW Associates	256-726-3995	RCW-Assoc@comcast.net
Mr. Eric Dees	Lockheed Martin	817-763-7120	eric.dees@lmco.com
Ms. Porscha Porter	ARMDEC		Porscha.porter@us.army.mil
Mr. Chase A. North	TVA	423-751-7570	canorth@tva.gov
Mr. Jody Clay	Alabama Power	205-257-3800	jcclay@southernco.com
Mr. Michael Webb	Rolls-Royce	317-230-8229	Michael.webb@rolls-royce.com
Mr. Raychon Betts	ARMDEC		Raychon.Betts@us.army.mil
Mr. Chad C. Kelly	Boeing	314-777-7857	Chad.C.Kelly@boeing.com
Mr. Robert Parker	NASA/MSFC		Robert.parker@msfc.nasa.gov
Mr. David Medford	Boeing		David.K.Mefford@boeing.com
Mr. James R Schaffer	Boeing	256-461-2662	James.r.Schaffer@boeing.com
Mr. Davie Smith	DIA/MSIC	256-313-7400	des@msic.dia.mil
Mr. Miree Squire	Northrop Grumman		Miree.squire@ngc.com
Mr. Arthur McDonald	Consultant	256-527-8145	Arthurmcdonald3805@comcast.net
Mr. Patrick McManus	NASA/MSFC	256-544-3383	Patrick.mcmanus@msfc.nasa.gov
Mr. Roosevelt Conley	TEC Masters	256-721-6601	rconley@tecmasters.com
Dr. Mike Lowe	SAIC Corp.	256-319-4758	lowem@saic.com
Dr. Marvin Carroll	TEC Masters	256-830-4000	mcarroll@tecmasters.com
Mr. George Malone	Triana Industries	256-772-4304	gmalone@triana-ind.com
Ms. Carol Davenport	Intel	480-554-5718	Carol.a.davenport@intle.co
Mr. Corey Solomon	AAMU-EE Student	404-281-5626	Corey.solomon@yahoo.com

Mr. Ronald A. Loving	TVA	423-751-3435	Ronald.loving@tva.gov

E. Process for Review of the Program Educational Objectives

The CS Program educational objectives are reviewed periodically by the EECS Advisory Board. The process is schematically illustrated below in Figure 1. The PEOs are influenced by the departmental mission, the EECS Advisory Board, ABET expectations, and alumni and employer feedback. The Advisory Board meets on a semester basis and reviews all matters related to the Program including its educational objectives. Proposed changes to the educational objectives can be initiated by the CS faculty, Advisory Board, or the University administration. Any changes in the educational objectives must be approved by the Advisory Board. Following the approval by the Advisory Board, and the University administration, the revisions in educational objectives are reflected in the University Bulletin, University website and other University publications as appropriate.

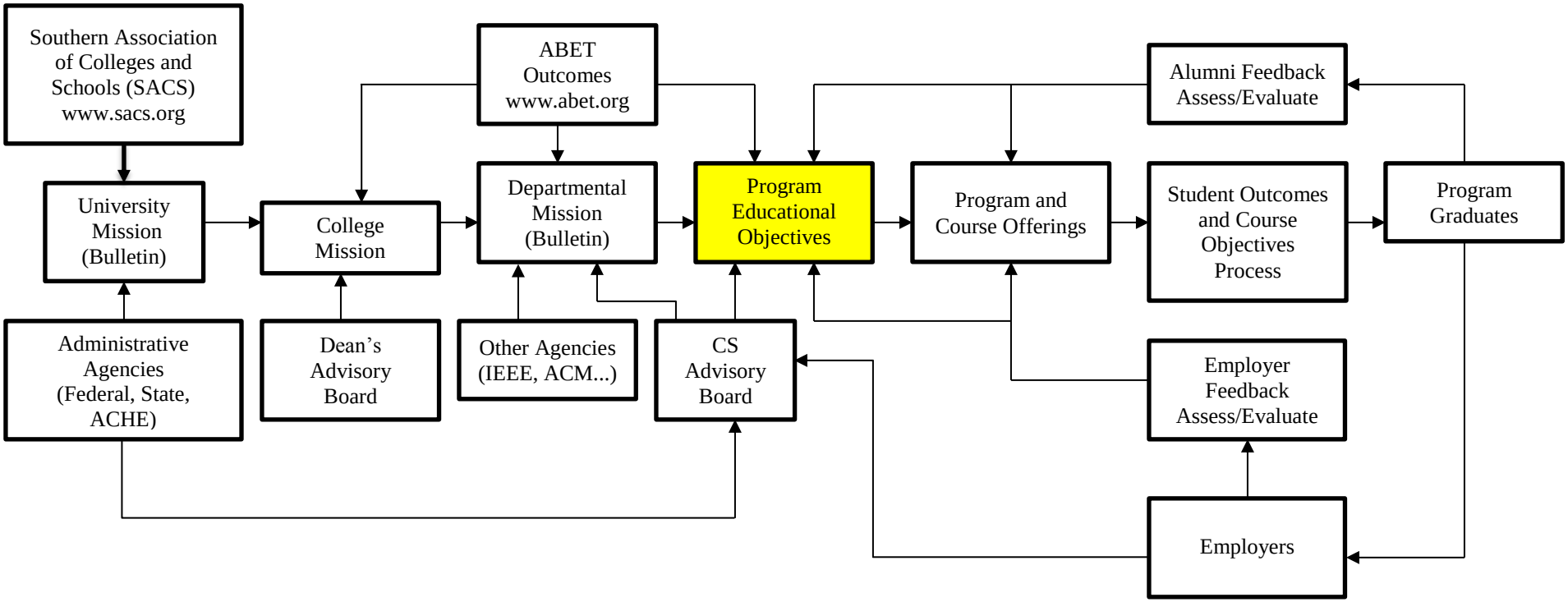


Figure 1. Process for Development and Revision of PEOs

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

The student outcomes for the CS program are:

1. Students will demonstrate critical knowledge, techniques, and tools of the discipline

   Performance Indicators
   a) Learn knowledge of programming and Object Oriented concepts
   b) Learn concepts of logic design, computer organization and operating system
   c) Learn hands-on experience to implement the critical concepts of programming

2. Students will apply appropriate and emerging mathematics, computer science, and engineering technologies to solve problems

   Performance Indicators
   a) Apply knowledge of Mathematics (Algebra, Functions, Relations, Calculus, Matrix Operations, etc.) to solve problems
   b) Apply knowledge of Computer Science (Programming, Algorithm Design, Data Structure, Computer Architecture, and Software Engineering Methods) and other emerging technologies to solve problems

3. Students will work as team members and with team leaders

   Performance Indicators
   a) Evaluate student's teamwork based on Collaboration, Participation.
   b) Evaluate team leader's work based on Leadership, Organization, Preparation, and Procedure
   c) Evaluate overall performance based on Capability, Commitment, and Progress

4. Students will have documented abilities for writing and presentation skills

   Performance Indicators
   a) Apply knowledge of technical writing skills to solve problems
   b) Evaluate presentation skills to Present Projects and Reports to the students and audience.

5. Students will apply one or more modern computer languages to problem solving

   Performance Indicators
   a) Apply knowledge of C++ to solve problems
   b) Apply knowledge of Java to solve problems

c) Apply knowledge of C# to solve problems

6. Students will clearly express the basis for responsible and ethical behavior in their profession and recognize the need for it

   Performance Indicators
   a) Understand the code of conduct and ethical principles for the computing profession
   b) Determine the appropriate reactions to the ethical, legal, social and security issues in the computing profession

7. Students will be able to implement concepts in software engineering, operating systems, computer architecture, and algorithm analysis

   Performance Indicators
   a) Implement concepts in software engineering
   b) Implement concepts in operating systems
   c) Implement concepts in computer architecture
   d) Implement concepts in algorithm analysis

The Computer Science Program has established an assessment process that is used for the continuous improvement of the program and its educational operations. The Student Outcomes are published on the CS program website at http://www.aamu.edu/Academics/engineering-technology/EE/Pages/Program-in-Computer-Science.aspx and posted on the program office. The CS course syllabi, distributed to students in every class, list the Student Outcomes addressed by the respective courses. The documentation of the assessment processes and evaluation results of Student Outcomes are maintained by the CS Program.

B. Relationship of Student Outcomes to Program Educational Objectives

The relationships between the PEOs and the Student Outcomes (1-7) are mapped below in Table 3. As can be seen, there are a number of outcomes associated with each objective. Attainment of these outcomes positions program graduates to successfully achieve the overarching program educational objectives. The extent of attainment of the program educational objectives is determined through various direct and indirect measurement instruments.

Table 3. Mapping of the Program Educational Objectives to the CS Student Outcomes

		Program Educational Objectives		
		a	b	c
Program Outcome	Description	They will work in careers in computing and associated technology fields	They will practice their professional endeavors, communicating effectively, as team members, in leadership positions to the highest legal and ethical standards	They will realize, mentor, and pursue a program of continuous educational improvement for the benefit of themselves and others in our dynamic and rapidly changing field.
1	Students will demonstrate critical knowledge, techniques, and tools of the discipline	X		X
2	Students will apply appropriate and emerging mathematics, computer science, and engineering technologies to solve problems	X	X	
3	Students will work as team members and with team leaders		X	
4	Students will have documented abilities for writing and presentation skills	X		
5	Students will apply one or more modern computer languages to problem solving	X	X	
6	Students will clearly express the basis for responsible and ethical behavior in their profession and recognize the need for it		X	
7	Students will be able to implement concepts in software engineering, operating systems, computer architecture, and algorithm analysis	X		X

C. Process for the Establishment and Revision of the Student Outcomes

The Student Outcomes are measured and documented using various direct and indirect measurement tools. Various instruments used for determination of the direct measures of the attainment of student outcomes include course rubrics and course outcomes spreadsheets that are utilized by the instructors for all the CS classes taught each semester. The outcomes spreadsheet for each class provides detailed information about the extent of attainment of each one of the particular outcomes that are addressed by that course. The attainment of each outcome associated with the course is recorded and tracked dynamically throughout the semester, for each student and the entire class. Student outcomes are aggregated across all CS courses in order to obtain a direct and quantitative measure of the extent of attainment of each student outcome at the program level. Other instruments utilized for direct and quantitative measurement of the extent of attainment of student outcomes include student design team peer evaluations. Additional modes of indirect outcomes evaluation include feedback from employers of student interns and student feedback following job interviews, and Co-Op and internship experiences. Indirect measurement instruments used for assessment of the level of attainment of student outcomes include various survey tools including Student Course Evaluation Form, Graduating Senior Survey Form and Alumni Survey Form.

At the end of the academic year the Assessment Committee reviews these data to see if changes are needed either to specific courses or to the outcomes themselves. In addition, instructors can suggest changes to course content, delivery methods or assigned student learning outcomes. The Assessment Committee review both annual data and ongoing instructor feedback. If changes are recommended by the committee, any such recommendations are sent to the full faculty for discussion and voting.

These outcomes were developed and approved by the CS faculty during the preparation of the previous interim report for ABET accreditation. The CS faculty is responsible for collecting, reviewing, and interpreting information drawn from their taught courses. The outcomes assessment results are discussed at the program faculty meetings, where issues regarding student outcomes are identified and viable strategies are developed.

D. Enabled Student Characteristics

The 11 ABET Student Outcomes are mapped to the Program Student Outcomes in Table 4. The 7 student outcomes are mapped to the three Program Educational Objectives in Table 3. The 7 Student Learning Outcomes are mapped to performance criteria in one or more required courses in the program as shown in Table 5.

Table 4. Mapping of BSCS Program Outcomes to ABET Program Outcomes

Mapping Program Outcomes and ABET's Outcomes (a – k)								
	ABET/CAC Program Outcomes	**CS Program Outcomes**						
		1	2	3	4	5	6	7
a	An ability to apply knowledge of computing and mathematics appropriate to the discipline;	X						
b	An ability to analyze a problem, and identity and define the computing requirements appropriate to its solution;		X					
c	An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;		X					
d	An ability to function effectively on teams to accomplish a goal;			X				
e	An understanding of professional, ethical, legal, security, and social issues and responsibilities;						X	
f	An ability to communicate effectively with a range of audiences;				X			
g	An ability to analyze the local and global impact of computing on individuals, organizations and society;						X	
h	Recognition of the need for, and an ability to engage in, continuing professional development;		X					
i	An ability to use current techniques, skills and tools necessary for computing practices;		X			X		
j	An ability to apply mathematical foundations, algorithmic, principles and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;		X					X
k	An ability to apply design and development principles in the construction of software systems of varying complexity.		X					X

AAMU Computer Science Program Outcomes

1. Students will demonstrate critical knowledge, techniques, and tools of the discipline
2. Ability to apply appropriate and emerging material, science and engineering technologies to solve problems
3. Demonstrate a willingness to work with and as team members
4. Have documented abilities for writing and presentation skills
5. Demonstrate and apply one or more modern computer languages to problem solving
6. Clearly express the basis for responsible and ethical behavior in their profession and recognize the need for it
7. Show an understanding to concepts in software engineering, operating systems, computer architecture and algorithm analysis

Table 5. Mapping of CS Courses to Program Outcomes and Performance Criteria

	Computer Science Program Outcomes with Performance Criteria																		
Computer Science Courses	1a	1b	1c	2a	2b	3a	3b	3c	4a	4b	5a	5b	5c	6a	6b	7a	7b	7c	7d
CS 102	x		x	x							x								
CS 103				x															
CS 104	x													x	x				
CS 109	x		x	x							x								
CS 203				x					x										
CS 204	x		x																
CS 206	x		x									x							
CS 208		X		x															
CS 209		X		x															
CS 215			x								x			x					
CS 220		X		x															
CS 303		X																	
CS 304					x														
CS 305				x							x								
CS 306	x		x									x							
CS 309					x					x									
CS 311					x														
CS 314													X						
CS 315					x								X						
CS 320					x														
CS 321					x										x				
CS 328					x	x	x	x					X						
CS 329					x														
CS 330					x														
CS 380		X																x	
CS 381		X																x	
CS 384		X								x				x			x		
CS 386				x	x								x						x
CS 389		x			x									x			X		
CS 401						x	x	x						x		x			
CS 403					x	x	x	x		x			x			x			
CS 405					x														
CS 408					x														
CS 409					x	x	x	x											
CS 410					x	x	x	x	x	x					x				
CS 414					x										x		x		
CS 421					x										x			x	
CS 425				x	x	x	x	x	x	x									x
CS 435					x					x									
CS 440					x														
CS 450					x					x									x
CS 483					x														
CS 484					x														
CS 485					x														
CS 488					x	x	x	x		x									
CS 490					x					x									

CRITERION 4. CONTINUOUS IMPROVEMENT

The ABET General Criteria provide a blueprint for continuous quality assurance via an established list of eight criteria that must be satisfied for accreditation seeking programs. In recognition of these, the structure and processes that define the AAMU BSCS program have been heavily scrutinized in preparation of this Self-Study Report for consistency and adherence to these ABET requirements. As a result, a number of interacting entities and constituencies that are instrumental in defining the dynamic structure of the AAMU program have been identified. An effort to capture these entities and their relationships in a holistic view of the AAMU—BSCS program is shown in Figure 2. As can be seen, even at this high level, the program is influenced by a wide variety of entities, and the influence exerted on the program by any given entity can be very dynamic in time and/or magnitude. Furthermore, the mechanism by which each influence is applied to the program also widely varies. Some entities have influenced by virtue of financial means (funding agencies), others via their solicited opinions and surveys (alumni, employers), and some offer regulation and oversight (e.g. State, University and Advisory Board). This mélange of interaction is very difficult to model, analytically describe and especially to quantify. Although much of the influences on the program are asynchronous and unpredictable, the faculty has established a number of regular procedures at different levels in the process to help monitor and improve the performance of the program at regular intervals.

A description of the assessment, evaluation and continuous improvement process architecture shown in Figure 2, along with Assessment Processes, Governing Elements, Stakeholders (Constituencies) involved, Assessment Data Collection Schedule (Frequency), Documentation procedure, assessment Tools used, Data Analysis, Review of Results and Evaluation of Impact of the Actions, is given in Appendix A-1. A schedule of the different assessment activities is given in Appendix A-2.

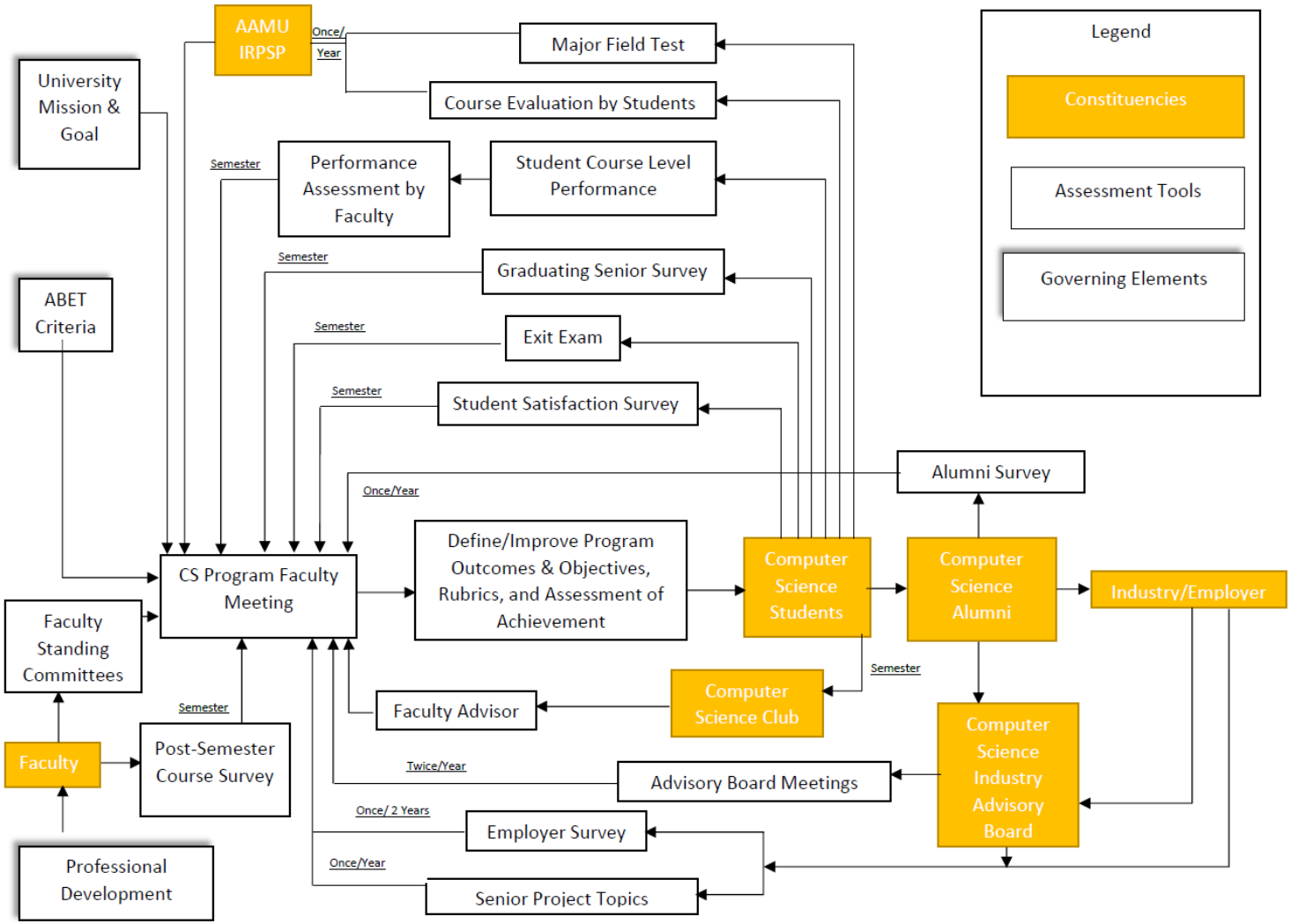


Figure 2. CS Program continuous improvement architecture showing constituencies, assessment tools, governing elements, assessment schedule (Frequency), and the processes and flow of data/information.

A. Student Outcomes

A schematic of how the Student Outcomes are expressed at the program and individual course level, and how they are measured and evaluated for input to the continuous improvement process is shown below in Figure 3. Feedback for continuous improvement happens at two levels in this dynamic process. The inner loop feedback cycle occurs during each semester of course offering, providing a measurement of student success at the course level, which can be used as information for the instructors to modify individual courses. The outer feedback loop functions on an annual basis, where analyses of the SOs for the individual courses are aggregated to provide measureable data for the continuous improvement process at the program level.

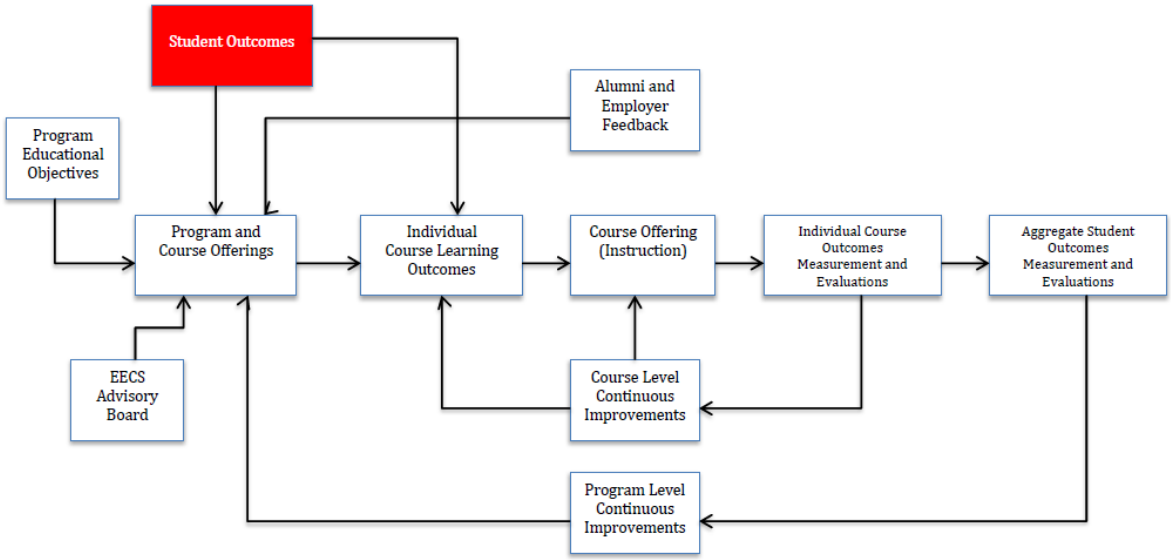


Figure 3. Student Outcomes and Continuous Improvement Loop

The SOs, coupled with the PEOs and input from the program stakeholders, help shape the structure of the Program and the content of the curriculum. Each individual course within the Program is characterized by a set of Course Learning Outcomes that detail what students are expected to attain from the course. Each course syllabus contains this mapping matrix with outcomes specific to that course. Syllabi for all the courses in the BSCS program are shown in Appendix B – Course Syllabi. A mapping of all the CS courses to the Program Outcomes and Performance Indicators is given as Table 5. Students' performance in the course is evaluated, and provides feedback for course level improvements. Also, the performance on each individual course is aggregated across CS curriculum to provide a measurement of overall SO achievement. These are coupled with other measures of the SOs and provide feedback for continuous improvement at the program level.

Figure 4 provides further details of how Course Outcomes are utilized to measure SOs and provide feedback into the continuous improvement process. The Course Outcomes (Course Learning Outcomes) are directly mapped to the relevant SOs supported by the course, and the mode(s) of measurement that applies to the outcome. As courses are conducted throughout the academic year, students' performance on the Course Outcomes is quantitatively assessed by the instructor. In addition to mapping the SOs to the Course Outcomes, instructors must take that concept to another level, and map SOs to each assignment given in the course. Then, the numeric results obtained for each assignment via traditional grading, are assessed on each SO that has been associated with that particular assignment by the instructor.

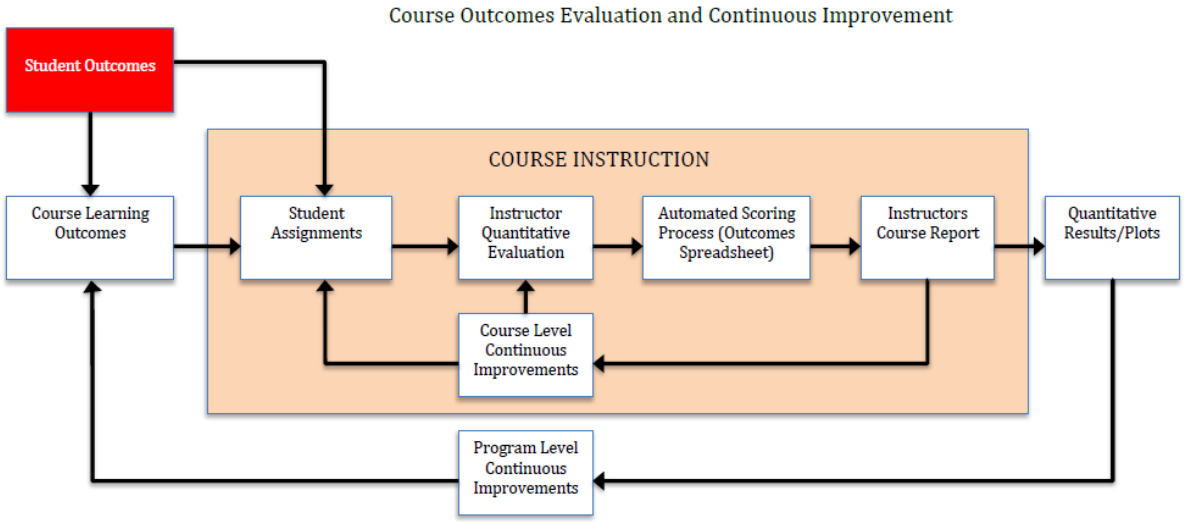


Figure 4. Course Outcomes Evaluation

For example, a course as a whole may contribute to outcomes 1a, 2b and 3c. If Quiz #2 is adjudged by the instructor to contribute only to outcome 2b, no weight is given to outcomes 1a and 3c for that assignment. Only assignments contributing to an outcome are utilized to score the outcome for the course. If an assignment has nothing to do with a given outcome, no weight is given to it.

These weighted SO scores are tracked throughout the semester, and translated to provide an ongoing measurement of the SO achievement while the course is being conducted. This is accomplished with the aid of an Excel spreadsheet application for each course to help moderate the amount of paperwork required for instructors. The application was developed by the CS program faculty in response to previous ABET reviews. The calculation for the overall SO attainment in the course is a function of the scores on individual assignments correlated to the outcomes pertaining to that assignment, then scaled to provide a 0 – 100% measurement. All assignments that pertain to a given SO are treated equally in the assessment of that SO.

The procedure employed for the processing, analysis and use of the course student learning outcome and program outcome assessment data is described in Appendix C-1. The tools employed for collecting, charting and reporting the outcomes assessment data/results are given in Appendix C-2.

To summarize, each CS course addresses at least one of the CAC SOs. Each component of a particular course such as various homework assignments, quizzes, exams, project reports, experiments, oral and written presentations, etc. is related to one or more student outcomes that are addressed by that course. The performance of each student in the course is assessed with respect to each of the student outcomes that are addresses by that course. This process provides the course instructor with real-time feedback and the ability to dynamically tract the degree of attainment of each one of the course-specific SOs as the semester progresses, and take corrective actions if needed. At the conclusion of each semester, each student, in addition to the course score receives a numerical score on each one of the SOs that the course addresses.

The Instructors Post-Semester Course Assessment Reports are generated for each required course and most elective courses taught in the BSCS curriculum. These results will be available for examination by the reviewer during the general review.

With the assessment tools mentioned above, a detailed example of the Course Outcomes Evaluation process is shown in Appendix C-3 with Course Student Learning outcome Assessment Tool and Appendix C-4 with Instructor Post-Semester Course Assessment Tool.

The individual student performances and the Instructors Post-Semester Course Assessment Reports are used to provide course level continuous improvements. The Observed Shortcomings, and Corrective Actions Planned, sections on the Instructors Post-Semester Course Assessment Reports can be utilized by the instructor(s) to provide documentation for continuous improvement efforts at the course level.

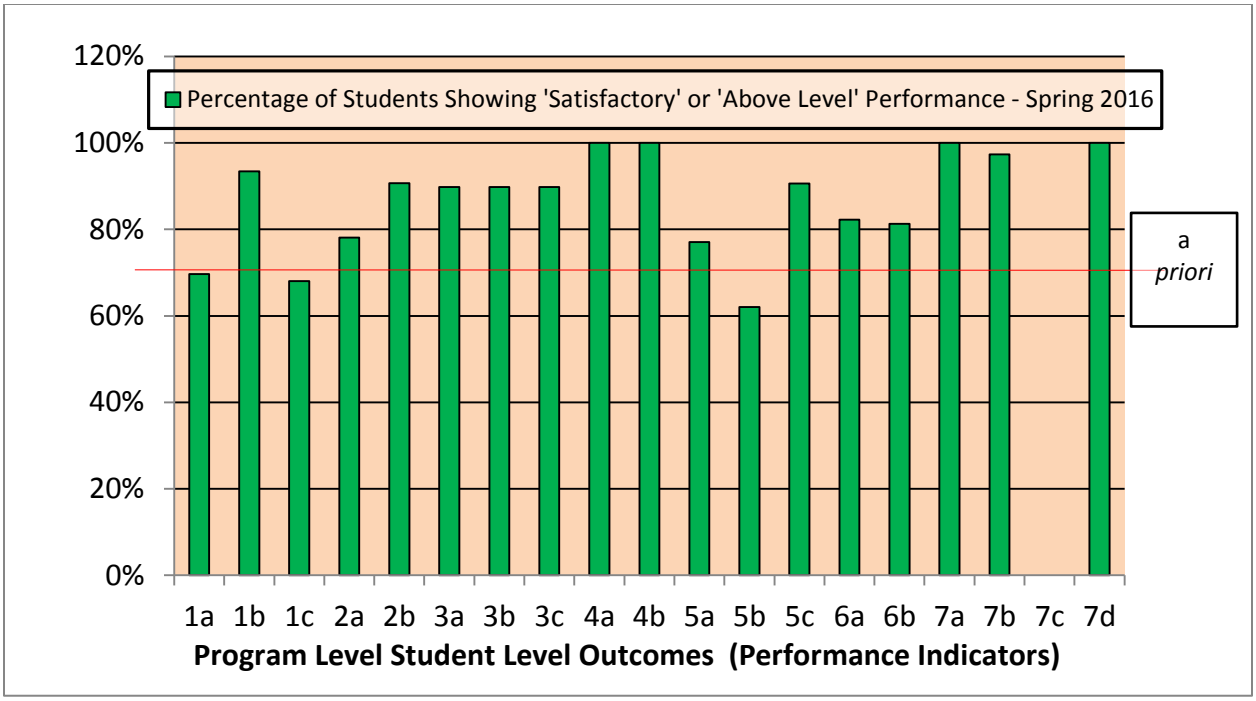
The SOs score distributions for a particular course provide the CS faculty with assessment metrics for determining the extent to which the course satisfied its intended outcomes. Examining the SOs score distributions for a particular course over several semesters provides the CS program with information that can be used to identify weaknesses in a course, and is utilized for course-level improvements of the program. Course level SO plots for the BSCS program courses of this year (2015-2016) are displayed in Appendix D-Student and Course Outcomes Assessment. The rows and columns correspond to CS courses and the CS SOs, respectively. Each row shows the degree of attainment of the targeted outcomes for the respective course.

After multiple assessment rounds, the CS faculty has set the following performance targets. If at least eighty-percent of students in a class obtain the score of eighty-percent or higher on an outcome, the level of attainment of that outcome in the course is considered Above Satisfactory (A). If the proportion of students who score higher than forty-percent on an outcome is between forty and eighty percent, the level of attainment of that outcome in the course is considered Satisfactory (S). If the proportion of students who score lower than forty-percent on an outcome is less than forty-percent, the level of attainment of that outcome in the course is considered low (L).

A priori targets are set for the Course Level Student Learning Outcomes Assessment. A sample rubric showing the criteria for performance levels and the a priori targets for each of the course student learning outcomes for the course CS 203 Discrete Structures is given in Appendix E. The rubrics for the rest of the courses in the curriculum will be displayed at the time of the visit in the fall of 2016.

The voluminous data from this year (2015-2016) supporting these results are shown in Appendix D – Student and Course Outcomes Assessment. The results plotted in Appendix D show the score distributions for each of the targeted outcomes of the respective course averaged over multiple offerings of the course. In each plot, the abscissa denotes various outcomes that are targeted by the respective course, and the ordinate represents the percentage of students whose scores on the particular outcomes fall within the indicated ranges. In addition to providing course level information, this data is re-characterized to support assessment of the SOs at the program level.

Individual course outcomes are couched in terms of the SOs that they support, and the results of these individual course outcomes are aggregated to provide a direct measurement of the overall achievement of SOs. Thus, the course level assessment process can be used to provide feedback at the program level. Measurement of the overall SO achievement level provides feedback for program level continuous improvements. A detailed example of the overall Student Outcomes evaluation process is shown in Appendix F with Program Outcomes Assessment Tool. The results of the program level student outcomes assessment from 2012-2016 are plotted in Appendix G. Figure 5 illustrates the linkage between the student outcome assessment process and program improvement with the data from spring 2016.



Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 1a, 1c, and 5b. No data for 7c due to the non-offerings of CS381, and 421 (These two courses are offered only in fall semester).

Shortcomings: The results highlighted lack of knowledge of programming and object oriented concepts, implementation of critical concepts of programming.

Suggested Action(s) for the next cycle: Adoption of teaching materials, projects and methods from industry, taking advantage of our partnership with Google in Residence Program.

Figure 5. An Example of CS Program Outcome Assessment (Spring 2016)

The Course Outcomes measurements described above are the primary measurements considered for the Student Outcomes (SOs). In addition to those, a number of other measurement instruments, both formal and informal, are utilized to assess and evaluate the degree of attainment of the Student Outcomes. These include both direct and indirect measurement instruments. The direct Outcomes measurement instruments include course outcomes assessment spreadsheets, end-of-semester instructor course assessment, senior design team peer assessments, Major Filed Test, and Exit Exam. The indirect Outcomes measurement instruments include student surveys, graduating senior surveys, and employer survey.

All survey tools with their rubrics are shown as Appendix H and include Graduating Senior Survey, Alumni Survey, Employer Survey, and Faculty Course Evaluation Survey. The results of these surveys in 2015-2016 along with positive findings, shortcomings, and suggested actions for the next time are also given in Appendix H. The mappings of the Alumni survey questions and

the Employer survey questions to the program educational objectives are individually given in Appendix H.

Exit Examination is given at the end of every semester to graduating seniors. The examination tests ethics, C++, Java, Data Structures, Operating Systems, Database, Algorithms, and Hardware related skills. The CS program's Exit Examination Committee administers the examination. The Exit Examination's Assessment Rubric consisting of the Performance Indicators, Performance levels and Target values is given as Appendix I-1. The results of the spring 2016 exit examinations showing the positive findings, shortcomings, and suggested actions for the next time it is offered, is given as Appendix I-1.

Major Field Test (MFT) in Computer Science from Educational Testing Service (ETS) is used as a direct measure to assess the graduating senior student's performance in the core computer science courses and thus supplementing the measures using the Course-level and Program-level outcome assessment and Exit examination. A mapping of the Assessment Indicators (as defined by ETS) to the CS core courses is given as Appendix I-2. The MFT rubric with the set a priori target is shown in Appendix I-2. The results of the spring 2016 MFT are given as Appendix I-2.

The frequency of use of the various measurement tools are enumerated in Appendix A-1 and A-2. Results are maintained by the Program secretary and a summary of the results are discussed in the Programing faculty meetings.

The evaluation process demonstrates that the minimum requirements are met by all of the student outcomes when considered as an average of the various measurement tools. The extent of attainment of the student outcomes, however, varies with the different measurement tools, and differs between outcomes. The results of the evaluation process of the degree to which student outcomes are met is maintained by the CS program and is partially maintained in the University Quality Enhancement Plan, SACS Academic Assessment files and Strategic Planning Online.

B. Continuous Improvement

The results of the evaluation process conducted for assessment of the extent of attainment of the program educational objectives and the student outcomes constitute the main sources from which decisions with regard to potential changes in the CS Program are based. Every semester, student outcomes assessment for every CS course is carried out. Faculty, individually, in small groups, and the entire CS faculty collectively examine the student outcomes assessment results and identify any potential weaknesses and opportunities for improvement of the course or the prerequisite courses in addressing the associated outcomes.

A summary of the continuous improvement process used in the BSCS program is given in Appendix J-1. A mapping of the data items/Origins to the program outcomes and program educational objectives are given in Appendix J-2 and J-3, respectively. The BSCS program's continuous improvement process includes the assessment approach that uses data sources (Stakeholders/constituencies), governing elements, assessment tools and data, frequency

schedule of data acquisition and assessment, data analysis, data review/change implementation, evaluation of impact, and documentation process every step of the way.

A number of "Program Improvement" efforts in support of the Continuous Improvement process have been undertaken in the BSCS program since the last general review. Significant Program Improvements that have come about as a result of the Continuous Improvement process are detailed in Table 6.

Table 6. Program Improvement Summary

#	Program Improvement Description	Year	Affected Program Area	Constituencies Initiating Improvement	Impacted Outcomes (SOs)	Supported Objectives (PEOs)	Estimated Affected Students (%)	Measurement of Effectiveness
1	Addition of CS 203 Discrete Structure, CS314 Advanced Programming, CS328 Object Oriented Design with UML, CS405 Linux w/Application Programming	2011	Current Students	Faulty, Current Students, ABET	2, 5	a, b	70	3.6
2	Modified Alumni and Employer Survey forms	2011	Alumni, Employers	ABET, Faculty, Alumni	2, 3, 7	a, b, c	NA	3
3	Initiated direct and quantitative course outcomes assessment process by implementation of the CAC outcomes spreadsheets	2011	Current Students	Faculty, ABET, Current Students	1-7	a, b, c	100	3.2
4	Implemented Banner Registration System to Automate Pre-Requisite Enforcement	2011	Current Students	Current Students, Faculty, University Administration, ABET	1, 7	a, c	100	3.2
5	Addition of indicators to the CS Program Outcomes	2012	Faculty, Current Students	ABET, Faculty	1-7	a, b, c	100	3
6	Implemented minimum	2012	Current	ABET, Faculty	1, 2, 5, 7	a, b, c	100	3.2

	number of programming assignments, and requirement for rigorous programming		Students, Faculty					
7	Revised Learning Outcome Rubric and Course Student Learning Outcome Rubric	2012	Current Students	ABET, Faculty	1-7	a, b, c	100	3.4
8	Addition of advanced topics for 300 and 400 level courses	2013	Current Students	ABET, Faculty	2, 5	a, b	100	3.6
9	Added CS386 Cryptography, modified CS321 Principles of information security, CS414 Forensic Computing, and CS421 Computer security	2013	Current Students	Faculty, Alumni	1, 6	a, b, c	50	3.2
10	Added free electives and made CMP 305 Numerical Analysis CMP 306 Visual Programming II as electives to accommodate STARS requirements	2013	Current Students	University Administration, Faculty	2, 7	a, b, c	100	3.3
11	Established cyber security concentration	2014	Current Students	Advisory Board, Faculty, Alumni, University Administration	2, 6	a, b	50	3.4
12	Updated all computers in lab 236 and hardware and software in each faculty	2014	Current Students, Faculty	Faculty, Current Students	1, 5	a, b	80	3.6

	office							
13	Modified the CS pre-requisites	2014	Current Students	Faculty, Current Students	1	a, c	100	3.8
14	Change the prefix for all CS courses from CMP to CS	2014	Current Students	Faculty	6	b	100	3.4
15	Updated all computers in lab 241 and 243	2015	Current Students	Faculty	1, 5	a, b	100	3.8
16	Initiated CS401 Software Engineering/CS403 Senior Problems teaching procedure	2015	Current Students, Faculty	Faculty, Current Students	3, 4, 5	a, b	100	-
17	Established new lab for cyber security research	2015	Current Students, Faculty	Faculty, Advisory Board, University Administration	1, 6	a, b	10	-
18	Reviewed all CS prerequisites and made changes	2016	Current Students, Faculty	Faculty	1	a, c	70	-
19	Established a partnership with Google in Residence Program	2016	Current Students	Faculty	1, 2, 5, 7	a, b, c	70	-
20	Started the accelerated BS/MS (4+1) program	2016	Current Students	Faculty, Advisory Board	2, 5, 6	a, b	10	-

The columns of the table contain information as follows:

- a brief description of each Program Improvement is given;
- the year that the improvement was initiated;
- the program area that is affected by the Program Improvement;
- the constituency(ies) that initiated and/or provided the impetus for the Program improvement;
- the Student Outcome(s) that should be influenced by the Program Improvement;
- the PEO(s) that are affected by the improvement;
- the estimated percentage of students that are affected by the Program Improvement; and,
- a direct measurement of the effectiveness of the Program Improvement on the 4 point scale {Strong Improvement (4), Improvement (3), Neutral to Minimal Improvement (2), Ineffective Improvement (1), Strongly Ineffective Improvement (0)} as determined by survey of Program faculty.

Assessments of student performance in programming class learning outcome, programming assignments/Homework, and inputs from ABET evaluation led to addition of 13+ programming assignments, at least one of these assignments should be implemented with number of lines of code ranging from 50 to 100 in 100 and 200 level programming courses. For 300 and 400 level course there should be programming assignments with implementation exceeding 2-3 pages. Assessments of student performance in programming class learning outcome, programming assignments/Homework, and inputs from ABET evaluation and anecdotal inputs from employer of CS graduates, led to Addition of advanced topics for 300 and 400 level CS courses. Faculty assessments of student performance in intermediate and advanced courses including CMP 381 Computer Organization, CMP 384 Operating Systems, and CMP 488 Database Systems, and input from alumni survey, led to the addition of CS386 Cryptography, modified CS321 Principles of information security, CS414 Forensic Computing, and CS421 Computer security. Input from the Academic Affairs office, assessment of student performance in mathematical courses, led to addition two free elective courses to the curriculum, and making CMP 305 Numerical Analysis CMP 306 Visual Programming II as electives to accommodate STARS transfer agreement.

Input from Advisory board, and other constituents including government and industry professional who attend CS410 Seminar, STEM day and CETPS Dean's speaker series, and alumni, led to establishment of cyber security concentration. Faculty assessments of the CS lab equipment, input from Advisory board, and other constituents including government and industry professional who donate software, hardware, and modern furniture, led to establishment of the new cyber security research lab.

C. Additional Information

Copies of assessment instruments and materials referenced in Criteria 4.A and 4.B will be available for review at the time of the visit. Minutes of faculty meetings and Advisory Board meetings where assessment results were evaluated will also be available.

CRITERION 5. CURRICULUM

A. Program Curriculum

The degree of Bachelor of Science in Computer Science (BSCS) is offered in two concentrations of General, and Cybersecurity. The BSCS degree program, in all two concentrations, consists of 129 semester hours. The student plans of study for the two concentrations of the BSCS degree program are listed in Table 7, and Table 8.

The BSCS curriculum is designed and implemented in alignment with the program educational objectives (PEOs), which are listed in CRITERION 2, PROGRAM EDUATIONAL OBJECTIVES. Specifically,

- PEO #1, "Graduates will work in careers in computing and associated technology fields ," is addressed through the methodical sequence of course and laboratory requirements, an array of elective courses, and a required capstone senior design sequence. The required mathematics and science courses provide the foundations upon which the introductory and intermediate computer science courses are based. The fundamental principles of computer science are taught in required CS courses and laboratories, where students become familiar with programming languages, computer software and hardware, data structures, and discrete structures that constitute complex computer software engineering systems. The compulsory and elective senior-level courses provide the depth and breadth of knowledge necessary to connect the basic level understanding of programming languages, computer software and hardware, data structures, and discrete structures, to the design, develop, test, and integration of complex computing systems. The curriculum, through the capstone design sequence in the senior year, teaches students the process of synthesizing various elements of knowledge including mathematics and basic science, various software engineering topics and computational methods to collaboratively design a system or a program to meet certain requirements.

- PEO #2, "Graduates will practice their professional endeavors, communicating effectively, as team members, in leadership positions to the highest legal and ethical standards," is addressed through various required written and oral reports in laboratories and courses. This objective is also addressed through discussions, presentations, assignments, and student papers in CS 104, and the capstone senior design sequence. This objective is also partially addressed through the general education courses of the BSEE curriculum including the required history sequence, the required composition sequence, and humanities electives.

- PEO #3, "Graduates will realize, mentor, and pursue a program of continuous educational improvement for the benefit of themselves and others in our dynamic and rapidly changing field," is addressed partially through various student professional organizations including the student chapters of Institute for Electrical

and Electronic Engineers (IEEE), Association for Computing Machinery (ACM), and the National Society of Black Engineers (NSBE), which are active in the college, and arrange seminars and presentations on a regular basis. This objective is also addressed through active faculty participation in counseling students about potential career paths and graduate education. Students become familiar with the fast pace of technology and the need to keep their knowledge and training current through various class assignments, their work on the senior design project, potential industrial and government internships, and working with CS faculty as undergraduate research assistants.

The CS Program student outcomes are listed in Criterion 3-A. The attainments of all of the outcomes are addressed by the BSCS curriculum in its entirety. The curriculum is comprised of four major components including: mathematics and basic science; required and elective humanities and economics courses including six hours of writing-intensive composition sequence, six hours of world history, and nine hours of literature, music and fine arts; required CS courses and laboratories including senior design sequence; and the elective CS courses.

Each outcome is supported by one or more components of the CS curriculum. Each constituent of the curriculum, to varying degrees, addresses one or multiple student outcomes (SOs).

•SO(1), "Students will demonstrate critical knowledge, techniques, and tools of the discipline," is attained primarily through various required laboratory experiences and the senior design project.

•SO(2), "Students will apply appropriate and emerging mathematics, computer science, and engineering technologies to solve problems," is supported through mathematics and basic science requirements as well as various required courses and laboratories in the CS curriculum.

•SO(3) and SO(6), "Students will work as team members and with team leaders; Students will clearly express the basis for responsible and ethical behavior in their profession and recognize the need for it," are all addressed through the senior design project. In addition to CS courses, they are also addressed through humanities requirements, and student organization activities.

•SO(4), "Students will have documented abilities for writing and presentation skills" is addressed through writing-intensive composition courses, CS 104, other selected CS courses as well as the senior design sequence.

•SO(5), "Students will apply one or more modern computer languages to problem solving," is addressed through programming language courses and 300-400 level CS courses including the senior design project.

•SO(7), "Students will be able to implement concepts in software engineering, operating systems, computer architecture, and algorithm analysis," is addressed by required laboratory and simulation experiences throughout the curriculum in addition to the senior design sequence.

The following flowcharts depicted in Figure 6 and Figure 7 illustrate the prerequisite structures of the program's required courses for all BSCS concentrations. Course acronyms and corresponding course names for each CS degree option are defined in Table 7 and Table 8 respectively.

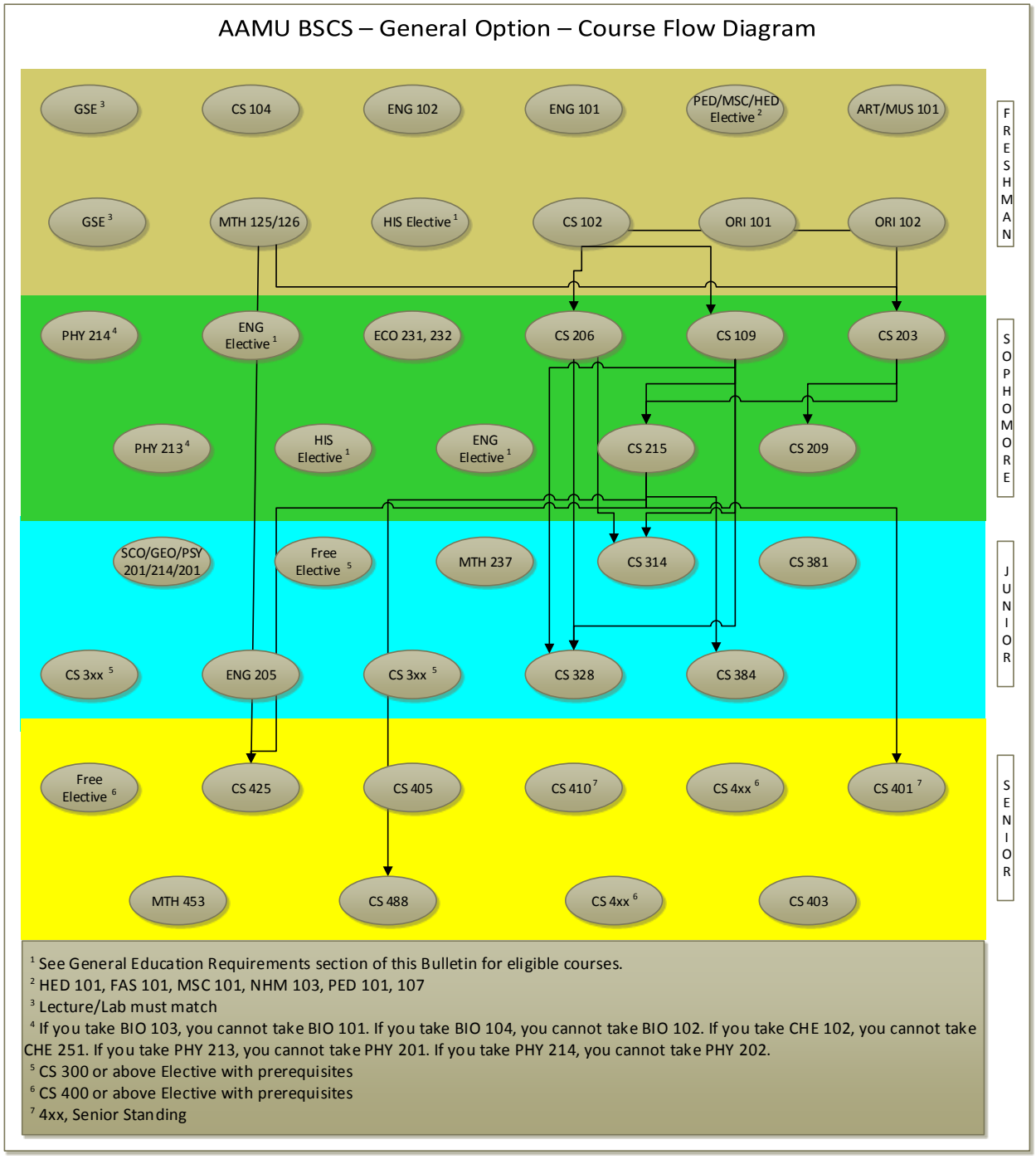


Figure 6 BSCS – General Option – Course Flow Diagram

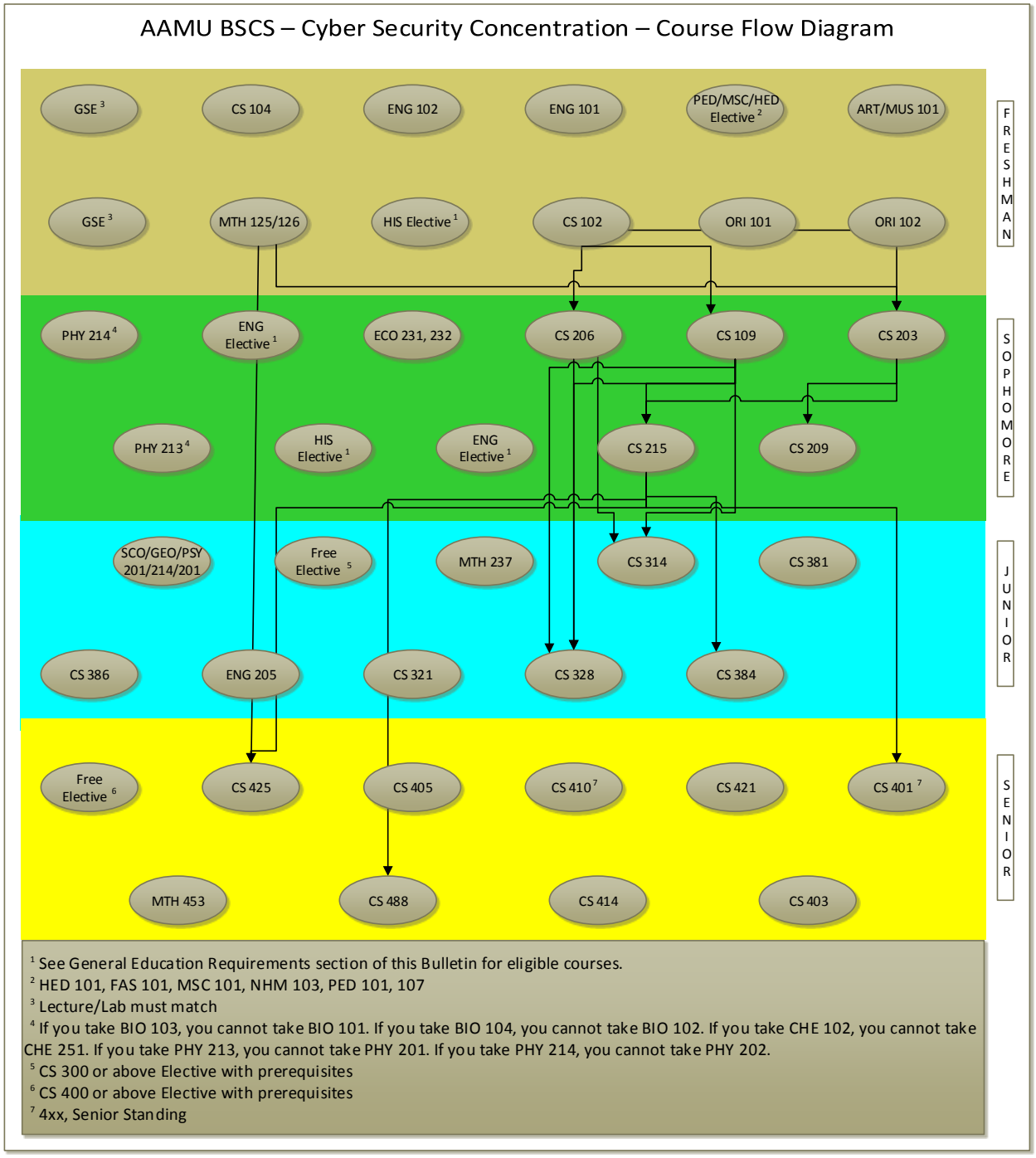


Figure 7. BSCS – Cyber Security Option – Course Flow Diagram

The required mathematics and basic sciences component of the BSCS curriculum comprises seventeen hours of mathematics including calculus (8) and discrete mathematics (3), and twelve hours of laboratory science including calculus based physics (8) and chemistry/biology (4). The

curriculum requires every student to choose linear algebra and probability and statistics. Mathematical topics such as linear algebra and matrices are treated at more advanced levels in CS 425, Theory of Algorithms. The BSCS degree program, therefore, meets the mathematics and basic sciences minimum semester credit hours requirement of 32. All students in the BSCS program are also required to take the three credit hour course MTH 453, probability and statistics, including engineering applications of these concepts. Students in the BSCS degree program are further exposed to advanced mathematical concepts including linear algebra, complex variables and discrete mathematics through the required CS courses.

All students in the BSCS degree program are required to take sixty-three credit hours of CS courses. Students are free to choose twelve credit hours of CS 300/400-level electives to satisfy this requirement. The curriculum requirements contain twenty-four credit hours of general education courses including six credit hours of history, nine credit hours of English, three credit hours of economics, and six credit hours of humanities and fine arts. Other requirements are 2 credit hours of first year experience and 2 credit hours of Health or Physical Educations. In addition students are allowed to take two three-credit hours of free electives. Students are encouraged to take mathematical or computer science elective courses.

Students in the BSCS degree program are introduced to the process of software engineering design throughout the curriculum. All BSCS degree candidates must complete six credit hours of software engineering design, comprised of a sequence of two Senior Design courses, CS 401 and CS 403.

In the senior design sequence, teams of students, normally comprised of 2-4 members each, select a project in the fall semester of their final year, and under supervision of a faculty mentor, work on the project for two semesters. Design project proposal ideas are generated by faculty, government, industry, or students and, after CS faculty approval, are presented to students in the senior design class in the fall semester. Students are given the opportunity to select a project and their team members, and commence working on the project once they obtain the consent of a CS faculty to act as their mentor. Senior design teams, whose projects are proposed externally, may have an external advisor in addition to the CS faculty mentor.

To successfully complete their senior design projects, students must utilize knowledge and skills acquired in basic and intermediate courses including research, problem definition, problem formulation, engineering problem solving, analysis, simulation, coding, design iteration, fabrication, test and measurement, communication and presentation proficiency. Students learn to collaborate by working in teams, divide responsibilities, scheduling, and project management. Some projects may involve regulatory and economic issues.

In addition to a final report, student teams are required to give formal presentations to an audience comprised of the senior design class, the entire CS faculty, and observers from within and outside the university. Senior design teams must also participate in the CS Poster Presentation, and the University STEM Day Conference, at the end of school year, where university faculty, students, EECS Advisory Board, and observers from industry and government review the design projects and interact with design teams. The senior design experience helps to

prepare graduates for engineering practice, by further sharpening their technical, presentation, teamwork, and project management skills.

The BSCS degree program, in general, does not allow cooperative education to satisfy curricular requirements. Under special circumstances up to three (3) CS credit hours are awarded for preapproved internship or Co-Op work. In order to receive academic credit for work, the student must have it approved by a CS faculty and the supervisor at the company where the proposed work will be done. Grades are determined by the supervisor's evaluation, student report and student evaluation in addition to the co-op coordinators evaluation of the students over progress along with due dates. The student will earn three credit hours, which will replace one of the CS3xx or 4xx electives. To obtain approval to take CS 484 Internship, the student should present to the CS program coordinator a Letter of Appointment detailing the proposed activities and expected results. Following completion of the work period, the student should submit formal monthly reports. The supervisor at the company where the intern works will submit mid-term performance and final performance reviews. The CS coordinator will give the student a final grade based on the monthly reports and performance reviews.

Course folders containing course syllabi, textbooks, handouts, sample student work including homework, tests, projects, paper, etc. will be available for all CS courses and laboratories offered during the year covered by the self-study report. Course folders will also include assessment results.

Table 7. Curriculum for Bachelor of Science in Computer Science (BSCS), General Option

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.[1]	*Subject Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered[3]
		Math & Sciences[2]	Computing Topics Mark with an F or A for Fundamental or Advanced	General Education	Other		
Freshman Year (First Semester)							
ORI 101 First Year Experience	R			1		16S, 15F	30
ENG 101 Composition I	R			3		16S, 15F	30
MTH 125 Calculus I	R	4				16S, 15F	30
CS 104 Introduction of Computer and Ethics	R		3 (F)			16S, 15F	30
General Science Elective *(BIO101/102/103/104/203/204/ or CHE 101/102/111/112/251 or PHY 101/101H/102/201/202)*	SE	3				16S, 15F	30
General Science Elective Lab *(BIO101L/102L/103L/104L/203L/204L/ or CHE 101L/102L/111L/112L/251L or PHY 101L/101H/102L/201/202)*	SE	1				16S, 15F	30
PED/MSC/HED Elective *(HED, MSC 101, PED)*	SE			2		16S, 15F	30
Freshman Year (Second Semester)							
ORI 102 First Year Experience	R			1		16S, 15F	30
ENG 102 Composition II	R			3		16S, 15F	30
HIS Elective *(101/101H/102/102H/201/202/204)*	SE			3		16S, 15F	30
MTH 126 Calculus II	R	4				16S, 15F	30
CS 102 Introduction to Programming	R		3 (F)			16S, 15F	30
ART 101, MCS 101	SE			3		16S, 15F	30
Sophomore Year (First Semester)							
ENG Literature Elective Sequence *(201-202/203-204/207-208)*	SE			3		16S, 15F	30
PHY 213 Physics I	R	4				16S, 15F	30
HIS Elective *(101/101H-102/102H/201-202)*	SE			3		16S, 15F	30

CS 109 Introduction to Programming II	R		3 (A)			16S, 15F	30
CS 203 Discrete Structures	R		3 (A)			16S, 15F	30
Sophomore Year (Second Semester)							
ENG Literature Elective Sequence *(201-202/203-204/204H/207-208)*	SE			3		16S, 15F	30
PHY 214 Physics II	R	4				16S, 15F	30
ECO 231,232	SE			3		16S, 15F	30
CS 206 Visual Programming I	R		3 (A)			16S, 15F	30
CS 209 Introduction to Digital Logic Design	R		3 (A)			16S, 15F	30
CS 215 Data Structures	R		3 (A)			16S, 15F	30
Junior Year (First Semester)							
MTH237 Linear Algebra	R	3				16S, 15F	30
CS 314 Advanced Programming	R		3 (A)			16S, 15F	30
CS 381 Computer Organization	R		3 (A)			16S, 15F	30
CS 3xx Elective	SE		3 (A)			16S, 15F	30
ENG205 General Speech	R			3		16S, 15F	30
Junior Year (Second Semester)							
CS 328 Object Oriented Design with UML	R		3 (A)			16S, 15F	30
CS 384 Operating Systems	R		3 (A)			16S, 15F	30
CS 3xx Elective	SE		3 (A)			16S, 15F	30
SOC 201, GEO 214, PSY 201	SE			3		16S, 15F	30
Free Elective	E				3	16S, 15F	30
Senior Year (First Semester)							
MTH 453 Probability & Statistics	R	3				16S, 15F	30
CS 401 Software Engineering	R		3 (A)			16S, 15F	30
CS 425 Theory of Algorithms	R		3 (A)			16S, 15F	30
CS 488L Introduction of Database Systems	R		3 (A)			16S, 15F	30
CS 4xx Elective	SE		3 (A)			16S, 15F	30
Senior Year (Second Semester)							
CS 403 Senior Problems	R		3 (A)			16S, 15F	30
CS 405 Linux w/Application Programming	R		3 (A)			16S, 15F	30
CS 410 Seminar	R		3 (A)			16S, 15F	30
CS 4xx Elective	SE		3 (A)			16S, 15F	30

Free Elective	E				3	16S, 15F	30
Add rows as needed to show all courses in the curriculum.							
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		26	63		40		
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF PROGRAM	129						

1. **Required** courses are required of all students in the program, **elective** courses (often referred to as open or free electives) are optional for students, and **selected elective** courses are those for which students must take one or more courses from a specified group.
2. If math and science courses are chosen from a list indicate this and include information elsewhere on the courses that students may choose from.
3. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the maximum enrollment in each element. For selected elective courses, indicate the maximum enrollment for each option.

Table 8. Curriculum for Bachelor of Science in Computer Science (BSCS), Cybersecurity Concentration

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.[1]	*Subject Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered[3]
		Math & Sciences[2]	Computing Topics Mark with an F or A for Fundamental or Advanced	General Education	Other		
Freshman Year (First Semester)							
ORI 101 First Year Experience	R			1		16S, 15F	30
ENG 101 Composition I	R			3		16S, 15F	30
MTH 125 Calculus I	R	4				16S, 15F	30
CS 104 Introduction of Computer and Ethics	R		3 (F)			16S, 15F	30
General Science Elective *(BIO101/102/103/104/203/204/ or CHE 101/102/111/112/251 or PHY 101/101H/102/201/202)*	SE	3				16S, 15F	30
General Science Elective Lab *(BIO101L/102L/103L/104L/203L/204L/ or CHE 101L/102L/111L/112L/251L or PHY 101L/101H/102L/201/202)*	SE	1				16S, 15F	30
PED/MSC/HED Elective *(HED 101, MSC 101, PED 102 or 107)*	SE			2		16S, 15F	30
Freshman Year (Second Semester)							
ORI 102 First Year Experience	R			1		16S, 15F	30
ENG 102 Composition II	R			3		16S, 15F	30
HIS Elective *(101/101H-102/102H/201-202)*	SE			3		16S, 15F	30
MTH 126 Calculus II	R	4				16S, 15F	30
CS 102 Introduction to Programming	R		3 (F)			16S, 15F	30
ART 101, MCS 101	SE			3		16S, 15F	30
Sophomore Year (First Semester)							
ENG Literature Elective Sequence *(201-202/203-204/207-208)*	SE			3		16S, 15F	30
PHY 213 Physics I	R	4				16S, 15F	30

HIS Elective *(101/101H-102/102H/201-202)*	SE			3		16S, 15F	30
CS 109 Introduction to Programming II	R		3 (A)			16S, 15F	30
CS 203 Discrete Structures	R		3 (A)			16S, 15F	30
Sophomore Year (Second Semester)							
ENG Literature Elective Sequence *(201-202/203-204/204H/207-208)*	SE			3		16S, 15F	30
PHY 214 Physics II	R	4				16S, 15F	30
ECO 231,232	SE			3		16S, 15F	30
CS 206 Visual Programming I	R		3 (A)			16S, 15F	30
CS 209 Introduction to Digital Logic Design	R		3 (A)			16S, 15F	30
CS 215 Data Structures	R		3 (A)			16S, 15F	30
Junior Year (First Semester)							
MTH237 Linear Algebra	R	3				16S, 15F	30
CS 314 Advanced Programming	R		3 (A)			16S, 15F	30
CS 381 Computer Organization	R		3 (A)			16S, 15F	30
CS 386 Cryptography	R		3 (A)			16S, 15F	30
ENG205 General Speech	R			3		16S, 15F	30
Junior Year (Second Semester)							
CS 328 Object Oriented Design with UML	R		3 (A)			16S, 15F	30
CS 384 Operating Systems	R		3 (A)			16S, 15F	30
CS 321 Principles of Information Security	R		3 (A)			16S, 15F	30
SOC 201, GEO 214, PSY 201	SE			3		16S, 15F	30
Free Elective	E				3	16S, 15F	30
Senior Year (First Semester)							
MTH 453 Probability & Statistics	R	3				16S, 15F	30
CS 401 Software Engineering	R		3 (A)			16S, 15F	30
CS 425 Theory of Algorithms	R		3 (A)			16S, 15F	30
CS 488L Introduction of Database Systems	R		3 (A)			16S, 15F	30
CS 414 Forensic Computing	R		3 (A)			16S, 15F	30
Senior Year (Second Semester)							
CS 403 Senior Problems	R		3 (A)			16S, 15F	30
CS 405 Linux w/Application Programming	R		3 (A)			16S, 15F	30
CS 410 Seminar	R		3 (A)			16S, 15F	30

CS 421 Computer Security	R		3 (A)			16S, 15F	30
Free Elective	E				3	16S, 15F	30
Add rows as needed to show all courses in the curriculum.							
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		26	63		40		
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF PROGRAM	129						

1. **Required** courses are required of all students in the program, **elective** courses (often referred to as open or free electives) are optional for students, and **selected elective** courses are those for which students must take one or more courses from a specified group.
2. If math and science courses are chosen from a list indicate this and include information elsewhere on the courses that students may choose from.
3. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the maximum enrollment in each element. For selected elective courses, indicate the maximum enrollment for each option.

B. Course Syllabi

In Appendix B, include a syllabus for each course used to satisfy the mathematics, science, and discipline-specific requirements required by Criterion 5 or any applicable program criteria.

CRITERION 6. FACULTY

A. *Faculty Qualifications*

There are currently ten full-time faculty members in the CS program, including seven tenured faculties at the ranks of Assistant Professor (2), Associate Professor (4) and Professor (1), one tenure-track Assistant Professor, and two non-tenure-track Instructors.

Effective March 2014, the CS Program was authorized to fill two open tenure-track faculty positions, which had become vacant as the result of faculty retirements. Four faculty members have terminal degrees in computer science or computer engineering. Five faculty members have Master degrees in computer science or computer engineering and average fourteen years teaching experience at college level. Six faculty members have been with the Program for more than ten years. Faculty qualifications are summarized in Table 9, and their vitas are shown in Appendix K.

The CS faculty has the qualifications and expertise to adequately cover all the curricular areas of the Program. Faculty members have expertise in the general and specialty areas of computer science/engineering including image processing, software engineering, wireless computing, computational modeling and simulation, database management systems, and machine learning. Two faculty members are currently seeking Ph.D degrees in computer science. According to the current plans, one of the open faculty positions will be filled with an expert in the cyber security area, another position in the human and computer interaction area. All CS faculty members are engaged in professional development activities including research and consulting work. Faculty members are active in pursuit of externally funded research opportunities through which they have successfully developed dual-use advanced laboratories for undergraduate teaching and research. Research in the CS program is an integral part of the educational experience provided to our students. To the extent possible the CS faculty strives to intertwine their teaching and research activities by making their research accessible to students. The CS faculty regularly engages undergraduate students in their research and development activities.

B. *Faculty Workload*

Normal teaching load for each CS faculty is three class and laboratory sections per semester, and mentoring one or two senior design teams. Each senior design team is comprised of 3-4 students. Faculty is expected to maintain 10-12 regular office hours per week for student advisement and assistance. CS faculty members are expected to serve on department, college, and university committees as needed. All Faculty members engage in academic advisement of CS students including Senior Record Checks and the graduation clearance process. The faculty is actively engaged in all CS-related curricular decisions including establishing, monitoring and modifying of degree requirements, course contents, course outcomes, textbooks, laboratory experience, elective offerings, new course and laboratory development, etc. The faculty, in consultation with

other program constituents including EECS Advisory Board, is intimately involved in developing program educational objectives and student outcomes. The faculty is directly involved in the development and implementation of outcomes assessment tools, outcomes measurement processes, and utilization of outcomes assessment results for continuous improvement of the CS Program.

The Faculty members advise student organizations such as ACM, IEEE, NSBE, and provide students with career and graduate school related advice. The CS faculty members serve on various departmental, college and university committees, including Academic Standards, Tenure and Promotion, and Faculty Senate. The faculty is expected to engage in career development activities and keep their professional expertise current.

A summary of the faculty workload is shown in Table 10.

C. Faculty Size

The size and technical expertise of the CS Faculty is adequate for the Program at its current stage of development. Student-to-faculty ratio in the CS Program is roughly 25:1. Each CS Faculty, in addition to Senior Design mentorship, teaches three sections each semester. Every faculty is engaged in student advisement, university, college, and department service through various committee memberships, course and laboratory development and improvement, and faculty professional development activities. Every CS Faculty maintains at least 10-12 hours per week for regular office hours dedicated to interaction with students and providing academic counseling. Some CS Faculty members are engaged in sponsored cutting-edge research and strive to integrate their research with teaching. They make their research accessible to students and get undergraduate students directly involved in their research projects. The CS Faculty engages regularly in technical and scholarly interactions with professional practitioners in industry and government. Often, these interactions involve organizations that employ our students and graduates. The CS Faculty, through technical collaborations with industrial and government employers of the Program students and alumni, actively solicit feedback regarding the performance of our students and alumni in the workplace.

D. Professional Development

The CS program has limited travel budget that provides funds for each faculty to attend one conference or workshop annually. Through professional dedication and hard work of the faculty and the generosity of our industrial and government sponsors, the CS Program Faculty have access to state-of-art laboratory facilities and advanced computational resources. These resources have allowed the CS Faculty to engage in externally sponsored cutting-edge research and development activities, which provide the Program with multiple benefits. The faculty research efforts, in addition to providing opportunities for faculty to advance state of knowledge and keep their technical expertise current, also provide the CS Program laboratories with state-of-art instruments, faculty members with additional funds for travel and other professional development activities, and our students with the opportunity for involvement in advanced

research and summer and part-time employment in our laboratories. In recent years, CS Faculty and students have engaged in research collaborations with government laboratories such as National Security Agency, NASA Marshall Space Flight Center, US Army Aviation and Missile Research, Development and Engineering Center (AMRDEC), US Army Research Office, US Air Force Office of Scientific Research, US Army Missile Defense Agency, etc. by participating in summer faculty exchange and student internship programs.

E. Authority and Responsibility of Faculty

The CS Faculty takes genuine ownership of the Program and is directly involved in all decisions affecting the Program. Decisions affecting the curricular requirements of the CS Program, such as addition and deletion of courses are normally initiated by the CS curriculum committee, and must be approved by the Program and College committees and then forwarded to the University Academic Standards Committee for approval. The program educational objectives and students outcomes were developed by the CS Faculty in consultation with Program constituents including the CS Advisory Board, the College Dean and University Administration. The provost and university administration including the college dean develop the mission of the university, and the mission of the college. The CS Program faculty is responsible for developing the educational objectives and student outcomes of the CS Program, consistent with those of the university and the college. Potential modifications to the program educational objectives and student outcomes will initiated at the Program level by the Faculty in consultation with Advisory Board, and other Program constituents including the college dean, and university administration. The student outcomes assessment tools including the graduating senior and alumni survey forms were developed by the faculty in consultation with the dean and the Advisory Board. The CS faculty has primary responsibility for the continuous improvement of the CS Program.

Table 9. Faculty Qualifications – Computer Science

Faculty Name	Highest Degree Earned-Field and Year	Rank [1]	Type of Academic Appointment [2] T, TT, NTT	FT or PT [3]	Years of Experience			Professional Registration/ Certification	Level of Activity [4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Venkata Atluri	Ph.D., Zoology, 1986 MS, Computer Science, 1998	ASC	T	FT	1	18	18	ACM IEEE	M	M	L
Alak Bandyopadhyay	Ph.D., Mechanical Engineering, 2005	ASC	T	FT	11	12	12	ACM	M	H	H
Nelson Barnes	MS, Computer Engineering, 2002	AST	NTT	FT	19	10	10	ACM	H	M	H
Willie Bossie	MS, Computer Science, 2000	AST	T	FT	30	16	16	ACM, NEA, AEA	L	L	L
Jian Fu	Ph.D., Computer Science and Engineering, 2005	P	T	FT	5	20	14	IEEE	M	M	L
Yujian Fu	Ph.D., Computer Science 2007	AST	T	FT	2	9	9	ACM	H	H	H
Jay Gangasani	MS, Computer Science, 1988	I	T	FT	4	22	17	ACM, ASEE,AEA, NEA, PTA	M	H	M
Muhammad Ghanbari	Ph.D., Computer	AST	T	FT	3	39	21	ACM,	M	H	M

	Engineering, 1993							ORACLE cert			
Terry Miller	MS, Computer Science, 2002	I	NTT	FT	0	4	13	None	M	H	L
Xiang(Susie) Zhao	Ph.D., Computer Science, 2005	ASC	T	FT	5	15	9	ACM, ASEE, AEA, NEA, SAME	H	H	L
Albanie Bolton	Ph.D., Computer Science, 2014	A	NTT	PT	9	7	4	None	H	H	H
Robert William Clemons	MS, Physics, 1975	A	NTT	PT	40	12	12	None	L	M	M
Stephen U. Egarievwe	Ph.D. Applied Physics, 1998	A	NTT	PT	1	18	7	IEEE, ACM, ASEE	H	H	M
Julius Jow	MS, Computer Science, 2011	A	NTT	PT		11	11	Security+ Network+ ACM, IEEE	M	H	L
Wanda L. Lavender	MS, Computer Science, 2010	A	NTT	PT	15	7	7	IEEE, ACM	H	H	L

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track
3. At the institution
4. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

Table 10. Faculty Workload Summary – Computer Science

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Venkata Atluri	FT	F2015:CS104/3, CS215/3, CS321/3 S2016:CS104/3, CS414/3, CS215/3	75%	25%		100%
Alak Bandyopadhyay	FT	F2015:CS101/3, CS209/3, CS425/3 S2016:CS102/3, CS4109/3, CS209/3	70%	20%	10%	100%
Nelson Barnes	FT	F2015:CS102/3, CS109/3, CS401/3 S2016:CS101/3, CS102/3, CS403/3	75%	25%		100%
Willie Bossie	FT	F2015:CS203/3, CS381/3, CS384/3 S2016:CS101/3, CS384/3, CS203/3	80%	10%	10%	100%
Jian Fu	FT	F2015:CS309/3, CS484/3, CS570/3 S2016:CS450/3, CS543/3, CS550/3	50%	25%	25%	100%
Yujian Fu	FT	F2015:CS206/3, CS408/3, CS521/3,CS582/3,CS597/3 S2016:CS206/3, CS328/3, CS561/3,CS597/3,CS599/3	85%	10%	5%	100%
Jay R. Gangasani	FT	F2015:CS101/3, CS102/3, CS304/3 S2016:CS102/3, CS410/3, CS102/3	80%	10%	10%	100%
Muhammad Ghanbari	FT	F2015:CS101/3, CS314/3, CS533/3 S2016:CS102/3, CS386/3, CS551/3	70%	15%	15%	100%
Terry Miller	FT	F2015:CS101/3, CS101/3, CS104/3 S2016:CS101/3, CS101/3, CS104/3	75%	15%	10%	100%
Xiang(Susie) Zhao	FT	F2015:CS109/3, CS104/3, CS531/3 S2016:CS320/3, CS485/3, CS541/3	70%	20%	10%	100%
Albanie Bolton	PT	F2015:CS101/3 S2016:CS101/3	-	-	-	-
Stephen Egarievwe	PT	F2015: CS101/3, CS101/3, CS101/3 S2016:CS101/3, CS101/3	-	-	-	-
Julius Jow	PT	F2015:CS101/3, CS101/3, CS421/3 S2016:CS101/3, CS386/3	-	-	-	-

1. FT = Full Time Faculty or PT = Part Time Faculty, at the institution
2. For the academic year for which the Self-Study Report is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.
4. Indicate sabbatical leave, etc., under "Other."
5. Out of the total time employed at the institution.

CRITERION 7. FACILITIES[1]

A. Offices, Classrooms and Laboratories

The administrative, faculty, and clerical offices of the Computer Science program are housed in Arthur J. Bond Engineering and Technology Building (ETB). Administrative and faculty offices, including EECS Chairperson, CS secretary, and CS faculty offices are clustered in the same building and are easily accessible to students. Each faculty office with 140sq. ft. of floor space provides a comfortable setting for the faculty to work and meet with students. Each office is equipped with phone, computer, printer, scanner, filing space, bookcase, high speed internet, etc. In addition to individual faculty office space, the CS program has additional rooms providing copy and printing facilities and storage for student records and office supplies. For meetings, the CS faculty has access to two conference rooms on the same floor of ETB. For seminars and large meetings the CS program has access to the general use ETB auditorium, equipped with audio-visual facilities and seating capacity of over 200, located on the second floor of ETB. In addition to the above faculty and administrative offices, the CS program has two offices that are generally utilized by adjunct faculty and graduate students.

All the CS classes including CS laboratory courses are taught in the Arthur J. Bond Engineering and Technology Building with easy access to other AAMU campus buildings including the University Learning Resources Center, which houses the main library. In addition to the wall mounted writing boards in all CS classes and laboratories, every room is equipped with ceiling mount computer projectors and screens. There is an open computer laboratory located on the first floor of ETB with easy access for CS students. There are open computer labs in several other buildings on campus which are accessible to all students. In addition to the common computer labs in ETB and elsewhere on campus, students in the CS program have access to any of the CS computer laboratories, located in ETB Room 236, 241, and 243, which contains 31, 35, and 33 desktop computers, respectively. Each of these three labs is also equipped with one printer and one ceiling mount computer projector. The CS computer laboratory is generally open to students from 7:00AM to 8:00PM. The CS program has a cyber security lab in ETB Room 253, which holds 15 PCs, 5 MacBook computers and one printer, and is generally open to students when they work on security projects.

Computer laboratories are an essential item for a modern computer science curriculum. The Computer Science Dept. is will well equipped to meet its student needs with four modern computer laboratories. These laboratories are equipment with modern computers less than two years old and has current up to date software installed on all of the laboratories computers.

The department has four computer laboratories, located in Room 236, Room 241, Room 243, and Room 253, all located in the Arthur J. Bond Hall Engineering and Technology

Building. In addition, all computer science students have access to the Open Computer Lab located in Room 134.

Computer science student also have access to the Alabama Supercomputers, which are a 162 processor SGI ALTIX 450 system and a 1800 processor Dense Memory Cluster system. These computer systems are located off-site from the AAMU campus and maybe accessed by remote via the Internet.

All of the PC computes have Microsoft Windows 8 operating system software. The LINUX dual boot PCs have Ubuntu software version 13. Various software packages, such as Microsoft Office 13, Visual Studio 2013 (include Visual C++ and Visual C#), and Java SDK with NetBeans IDE 8.0.2 are loaded on all computers. Various other software packages, such as Oracle Database software, which are needed for certain courses are also loaded on a limited number of computers. In addition, computer science student have access to MULTISIM Electronic Workbench, LabView, and MATLAB/SIMULINK via the Open Computer Lab in Room 134. Appendix L contains a listing of the major pieces of equipment used by the BSCS program in support of instruction.

B. Computing Resources

Students in the BSCS program have access to multiple open computer clusters throughout campus including the open lab on the ground floor of the Learning Resources Center, which remains open 0800-2300 including weekends. In addition to campus-wide open clusters, students have access to the ETB open lab in Room 101, and the CS open computer lab 236, 241, and 243. These labs are open 0800-2000 on weekdays. The computation resources available to BSCS students include the following hardware resources as shown in Table 11, and the software resources as shown in Table 12.

Table 11. Computing Hardware Resources

Resource	Location	Description
A	AJB Hall Room 236	31 – Hewlett Packard Elite Desk800 i5
B	AJB Hall Room 241	35 – Hewlett Packard Elite Desk800 i7
C	AJB Hall Room 243	33 – Hewlett Packard Elite Desk800 i5
D	AJB Hall Room 253	5 – Hewlett Packard Elite Desk800 i7 5 – Apple Desktop 1 – Hewlett Packard MSR933 3G Router Wireless 2 – Hewlett Packard ProLiant DL160 Gen 8 Server 2 – Hewlett Packard HP 3000-10G-PoE+ Switch
E	AJB Hall Room 134	30 – Lenovo AMDx3 Dual Core 2.6GHz
F	Alabama Supercomputer	162 processor SGI ALTIX 450 system 1800 processor Dense Memory Cluster system

Table 12. Program Software Resources

Package	Platform	Description
Microsoft Office 2013	A,B,C,D,E	Office integrated development environment software
Microsoft Visual Studio 2013	A,B,C,D,E	C++ and C# integrated development environments software
Ubuntu LINUX 13	B,C	Operating system software
Microsoft Windows 8	A,B,C,D.E	Operating system software
Java with NetBeans IDE 8.0.2	A,B,C,D,E	Computer programming software
Oracle Database	B	Database management software
MATLAB/SIMULINK	E	Mathematics l simulation tools and software
MULTISIM Electronic Workbench	E	Digital electronic circuit design and simulation software
LabView	E	Design of hardware/software interface

C. Guidance

Proper operation of laboratory equipment and instruments including safety considerations are taught to students in every laboratory class. The effective utilization of computational resources including familiarity and fluency with the various software applications are taught in multiple courses and laboratories that require students to use these tools.

D. Maintenance and Upgrading of Facilities

The Process of maintaining and upgrading of laboratory and computational resources used by students and faculty in the BSCS program is handled at both the department and the college levels. The CS program is provided sufficient funds for the maintenance and upgrade of its laboratories through its annual budget. An annual budget of $20K for basic laboratory maintenance expenditure and upgrade of equipment and instruments is provided in the CS budget and Title III fund. The Title III funding ends in 2020. Since January of 2014, the College of Engineering, Technology and Physical Sciences purchased more than one hundred new desktop computers and replaced virtually all office and laboratory computers. The capital outlay for this was provided by the University and Title III funding. The funds for maintaining all user licenses for software tools in various computer laboratories and faculty offices are included in the annual college budget.

E. Library Services

J. F. Drake Memorial Learning Resources Center (LRC)

Drake LRC is the main library for the faculty and students of Alabama Agricultural and Mechanical University. The building is a three-level structure containing more than 76,000 square feet of floor space designed to accommodate 300,000 volumes and seat 1,000 users. Comprehensive renovation of the Drake LRC facility was completed August 2002. Through the renovation provisions for collaborative learning are now prominent throughout the second and third floors. The second floor learning commons provides access to more than 20 computers for students to access the Internet and library resources. Also, the Reading Room provides leisure space for students to engage in quite reading. The Makerspace (fab) Lab was established Spring 2016 and the APP lab will be operational on the second floor by Fall 2016. Additionally, a fully interactive Multi-Purpose/Distance Learning Auditorium which seats 171 is available on the first floor along with a computer lab and conference room.

Organizationally, the LRC has adequate and qualified staff to provide library services and programs to a diverse clientele on campus, in the community, and at distance sites. A team of professional librarians serves as the librarian liaison to each academic discipline to ensure the needs of the department are communicated for the acquisition of library resources. Drake LRC maintains and sustains a collection of resources that meets the curricula need of its student population. Drake LRC has a Collection Development Policy that is reviewed annually with detailed policies and procedures for faculty, staff, and students to make recommendations for the purchase of resources to be added to the collections. This policy includes the procedures to order and notify the requester when the materials have been processed and their location. The Collection Development Policy can be found on the library's webpage (www.aamu.edu/library). Moreover, Drake LRC Librarians reach out to faculty via email when publisher's notifications of new resources are receives for their interest in purchasing. This is inclusive of print and electronic resources.

The LRC is a multi-media informational center, which focuses on access in a plethora of formats. Moreover, Drake LRC is embracing the digital world to ensure faculty and students

have access to the library content s from any location. While print is very important to the research world, Drake LRC is aware of the number of students engaged in online or distance learning. Therefore, provisions are made for online learners when purchasing resources. Instructions for students to access library resources off campus, to request how to use a resource or request a librarian reference interview are available from the library's webpage (www.aamu.edu/library). Drake LRC maintains eighty two operational hours per week that is adequate for teaching and learning. Extended hours are maintained during mid-term and final examination periods. The current computer science holdings of Drake LRC are shown in Table 13.

Table 13. Drake LRC Library Holding for Computer Science 2015-2016

Holdings All collections and disciplines	**Computer Science Holdings Print**	**Computer Science Holdings ebooks**	**Databases, all disciplines**	**Computer Science databases**	**Journals**	**Computer Science Journals**
579,612	2,558	2,148	102	14	398 Print, 2,011	11

In addition, Drake LRC is a 25% repository of Government Document and maintains a small collection of government document through the Federal Library Depository Program (FLDP). Finally, for greater accessibility, Drake LRC use Films on Demand to deliver film and CD content for its faculty and students.

All library content is processed and maintained using the Sirsi Dynix Horizon 7.5.3 platform. The integrated library system allows catalogers to process resources for check-out, place holds on materials and identify library holding status and location. For resources not owed by the library, faculty and students make their request for interlibrary loan via ILLiad. Requests are processed timely for journals and books. Journal article requests are delivery directly to the requesters' desktop or mobile devices.

Course Reserve is another service that Computer Science faculty regularly engages. Materials that faculty want their students to have access is processed through Horizon and searchable by course number or faculty name in the online catalog. Course Reserves has a distinctive presence on the library website for easy accessibility. The policies and procedures for Reserves are posted on the library's website for faculty and students' knowledge of submitting and retrieving.

F. Overall Comments on Facilities

All the facilities utilized by students in the program including classrooms, laboratories, and libraries are located on the campus of Alabama A&M University and adhere to university safety codes. The AAMU Office of Environmental Health and Safety provides environmental health and safety service to the university community through technical and regulatory compliance assistance, information and training programs, consulting services and periodic auditing of environmental health and safety practices. The CS laboratory instructors review laboratory safety and emergency procedures at the start of each semester.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

The Computer Science (CS) Program is an academic component of the Department of Electrical Engineering and Computer Science (EECS). The Coordinator of the Computer Science Program is directly responsible for administration of the BSCS program. The Coordinator reports directly to the Chairperson of the Department of Electrical Engineering and Computer Science. An organizational chart indicating the BSCS program's position in the University hierarchy is provided in Figure 8. The quality and continuity of the BSCS program is ensured by its well qualified and dedicated core faculty, who has a vested interest in a thriving educational program, and the proactive CS Advisory Board. The CS faculty consists eleven full-time positions, eight members of which have been associated with the program for more than ten years each, and nine are currently tenured. The CS program is run based on the principle of shared governance, and the faculty under the leadership of the EECS Chairperson takes proactive roles in every major decision affecting the program at the department level. The CS faculty collectively and through the EECS Chairperson and the EECS Advisory Board is involved in all decisions at the College level that affect the program.

B. Program Budget and Financial Support

Alabama A&M University is a state supported institution and funding to sustain the CS program is derived primarily from state appropriations and student tuition via the University. The program's annual budget is determined through a systemic process which involves faculty input, budget request hearing, and approval steps. The process starts in early spring when the program coordinator in consultation with the faculty prepares the budget request form for the following academic year. The budget request is forwarded to the Chairperson of EECS department and then the Dean of the College of Engineering, Technology and Physical Sciences. Following the submission of the budget request, the Dean meets with the department chairpersons and program coordinators in order to formulate budget priorities and resource allocation plans. After finalization and approval of the budget request at the College level it is submitted to the Provost and Vice President for Academic Affairs. Formal budget hearings at the University level are conducted in mid to late spring where Vice Presidents, Deans, Chairpersons, and Program Coordinators may be asked to defend their requests in the presence of the university budget officials and the President. Following the budget hearings, final adjustments to the budget and approval by the President is made and the approved budget is given to the program. The AAMU administration is committed to provide the CS program with sufficient funds to maintain the quality of its educational program.

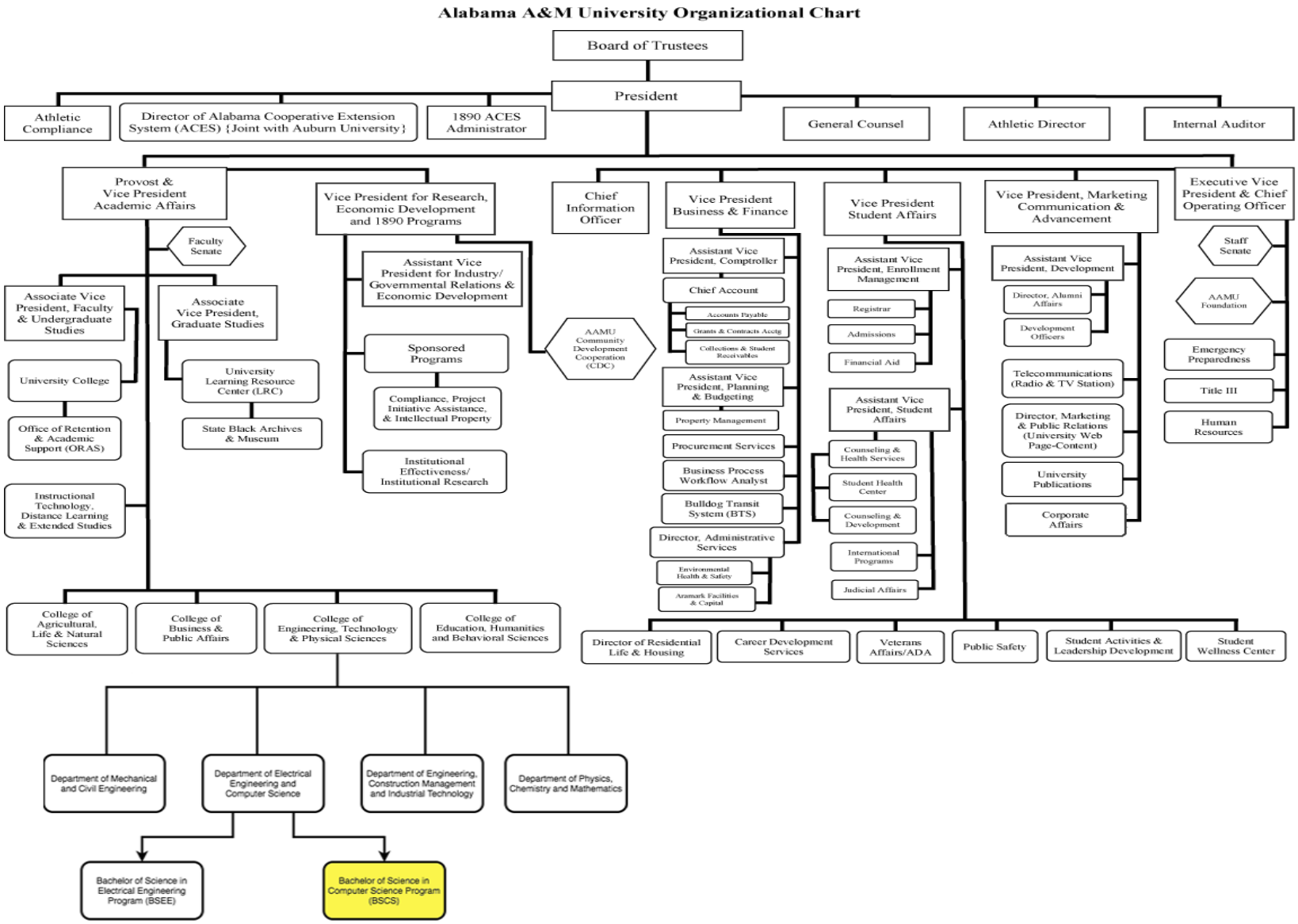


Figure 8. AAMU Organizational Chart

Each year, the CS program receives funds from the University's Title III Strengthening Grants Program for faculty travel and professional development. Since 2013, the program has received Title III funds for purchase of laboratory equipment. Computers, printers, and scanners in all faculty offices as well as computers in CS lab 236, 241, and 243 were replaced using Title III funds.

In 2011-12, the CS program has utilized funds provided by the NSF to support undergraduate students to work on real world projects. The other external research funds are also utilized for hiring undergraduate research assistants and enhancing CS laboratories. In the last six years, our faculty have been awarded with more than $2.25 million from the National Science Foundation, the U.S. Air Force, the U.S. Department of Education, and National Security Agency.

Alabama A&M University supports teaching through conducting several teaching and assessment workshops annually. Twice a year, at the start of fall and spring semesters, the university conducts the all-day Faculty Staff Conferences. A component of the Faculty Staff Conference involves inviting nationally recognized experts from outside and inside the university to conduct innovative teaching and assessment workshops for faculty. The CS program encourages the faculty to avail themselves of these professional enhancement opportunities. All grading in the CS program is done by faculty. One undergraduate student and one graduate student are supported with program annual budget to be teaching assistants.

In addition, Alabama A&M University has a strong commitment to student and faculty engagement in teaching and learning excellence. Under the direction of the Provost's Office, the Centers for excellence in teaching and learning (CETL) supports faculty, administrators, graduate students, and staff in their academic pursuits and provides a range of instructional services to assist all members of the Alabama A&M University teaching community. CETL offers assistance through the following programs: workshops and seminars, faculty learning communities, evaluation, and assessment. Additionally, serving as a center for the gathering, analysis, and dissemination of institutional information and data, the Office of Institutional Planning, Research and Effectiveness (OIPRE) will provide feedback about individual instructor's classroom performance.

The CS program is provided sufficient funds for the maintenance of its laboratories through its annual budget. An annual budget of $20K for basic laboratory maintenance expenditure is provided in the CS budget and Title III funds. One-time upgrades ($45K) to CS computers had been funded by Title III in 2013.

The University provides the CS program with sufficient funds to hire and keep the faculty and staff, as well as to equip and maintain the necessary laboratory infrastructure in order to sustain the program. The faculty, staff and laboratory infrastructure in the CS program is at a level which is sufficient for assuring that student outcomes are attained by the students in the program.

C. Staffing

The instructional staff of the CS program is comprised of ten full-time tenure-track faculty positions. Currently there are nine full-time faculty and two open faculty positions, one of which is expected to be filled in August 2016. The CS program utilizes part-time adjunct faculty to teach four or five sections each semester of classes. The faculty at its current level is sufficient to cover all the instructional requirements of the program.

The CS program has one full-time administrative secretary. The program shares on computer and network technician with several other programs in the College. The CS program has no dedicated technician.

D. Faculty Hiring and Retention

The program must justify the need for filling faculty positions that become vacant due to faculty retirements and departures. After approval at the College level, the request for filling the vacant faculty position, which includes position description, justification, desired academic and professional qualifications, and the list of members of the CS faculty search committee is forwarded to the Provost. Following approval at that level, it is forwarded to the Vice President for Finance and the President. The approved faculty positions are advertised by the Office of Human Resources and all application materials are submitted to that office online. The faculty search committee reviews the materials submitted by applicants and makes recommendations to the Chairperson. The Chairperson in consultation with the search committee chooses the candidates, and through the Dean requests the Provost's approval for hiring the new faculty.

The CS program strives to maintain a highly collegial atmosphere, where faculty is involved in all major decisions affecting the program at the program and department levels. The program is run based on the principle of shared governance, and the faculty has a true sense of ownership in the program. Every effort is made at the program level to keep teaching loads at a level that allow faculty sufficient time for pursuit of scholarly activities and professional development. The level of faculty compensation has been raised in 2013 and 2015. The University, also, has allowed faculty with sufficient research funding to supplement their nine-month salary by overload pay funded through their externally funded research projects.

The CS faculty is comprised of a group of dedicated, accomplished, and content teacher scholars who take pride in the thriving educational program they have helped to establish. The faculty has the required resources to assure that student outcomes are attained.

E. Support of Faculty Professional Development

Faculty professional development activities such as travel, workshops and seminars are partly funded through Title III. Title III funds provide, on average, roughly $2K per faculty for professional development activities on an annual basis. Approval for utilization of Title III travel funds is granted based on availability of funds at the program level. Some CS faculty members

have been successful in obtaining external research funding on a sustained basis. Faculty professional development activities are partially funded through externally supported research. Over the years, combined internal and external funding sources have provided the CS faculty with sufficient professional development funds. The University has an established faculty sabbatical policy, which allows faculty who qualify to spend one semester on sabbatical leave with full pay. In the past six years, no CS faculty has taken a sabbatical.

PROGRAM CRITERIA

Curriculum

All students in the BSCS degree program are required to take at least sixty-three credit hours of computer science topics. Students are free to choose twelve credit hours of CS 300/400-level electives to satisfy this requirement. The curriculum requirements contain twenty-four hours of general education courses including six credit hours of history, nine credit hours of English including six credit hours of writing-intensive composition, three credit hours of economics, and six credit hours of humanities and fine arts.

The required mathematics and basic sciences component of the BSCS curriculum comprises seventeen hours of mathematics including calculus (8), discrete structures (3), linear algebra (3), and probability and statistics (3), and twelve hours of laboratory science including general science (4) such as chemistry or biology, and calculus base physics (8). Mathematical topics such as linear algebra and matrices are introduced in CS 104, Computer & Ethics, and are treated at more advanced levels in CS 425, Theory of Algorithms. The BSCS degree program, therefore, meets the mathematics and basic sciences minimum semester credit hours requirement of 32. All students in the BSCS program are also required to take the three credit hour course MTH 453, probability and statistics, including engineering applications of these concepts. Students in the BSCS degree program are further exposed to advanced mathematical concepts including linear algebra, complex variables and discrete mathematics through the required CS courses.

Students in the BSCS degree program are introduced to the process of software engineering design and implementation throughout the curriculum. All BSCS degree candidates must complete six credit hours of software engineering design, comprised of a sequence of two Senior Design courses, CS 401 and CS 403.

In the senior design sequence, teams of students, normally comprised of 2-4 members each, select a project in the fall semester of their final year, and under supervision of a faculty mentor, work on the project for two semesters. Design project proposal ideas are generated by faculty, government, industry, or students and, after CS faculty approval, are presented to students in the senior design class in the fall semester. Students are given the opportunity to select a project and their team members, and commence working on the project once they obtain the consent of a CS faculty to act as their mentor. Senior design teams, whose projects are proposed externally, may have an external advisor in addition to the CS faculty mentor.

To successfully complete their senior design projects, students must utilize knowledge and skills acquired in basic and intermediate courses including research, problem definition, problem formulation, engineering problem solving, analysis, simulation, coding, design iteration, fabrication, test and measurement, communication and presentation proficiency. Students learn to collaborate by working in teams, divide responsibilities, scheduling, and project management. Some projects may involve regulatory and economic issues.

In addition to a final report, student teams are required to give two formal presentations to an audience comprised of the senior design class, the entire CS faculty, and observers from within and outside the university. Senior design teams must also participate in the CS Poster

Presentation, and the University STEM Day Conference, at the end of school year, where university faculty, students, EECS Advisory Board, and observers from industry and government review the design projects and interact with design teams. The senior design experience helps to prepare graduates for engineering practice, by further sharpening their technical, presentation, teamwork, and project management skills.

Appendix A-1 Continuous Improvement Process

The following is the description of the Assessment Processes, Governing Elements, Stakeholders (Constituencies) involved, Assessment Data Collection Schedule (Frequency), Documentation procedure, assessment Tools used, Data Analysis, Review of Results and Evaluation of Impact of the Actions, in the Continuous Improvement Process adopted by the CS program. The Continuous Improvement process is cyclic with the data collection and processes at different frequencies.

Assessment Approach:

- The CS program faculty discusses and develops/updates the assessment plan, procedures, methods, tools needed for assessing the program
- The CS program develops the frequency and schedule for implementing the assessment plan
- The CS program develops/updates the necessary data acquisition tools, assessment tools, and Rubrics
- Acquire assessment data using the data acquisition tools
- Analyze and Process the data
- Review the Data/Results
- Make program decisions (changes in the program/ processes/strategies) based on data review, and criteria and targets defined in the rubrics
- Implement these decisions
- Evaluate the impact of decisions
- Repeat these tasks for the next assessment cycle

Governing Elements:

- University Mission and Goals
- ABET Criteria
- Faculty Professional Development

Documentation:
All the plans, processes, data, results, and minutes of the meetings are documented. Any changes to the existing process/procedure will also be documented. The documentation includes the raw data, analysis and review of data, and implementation actions and their impact.

Data Sources (Stakeholders): The best sources of meaningful assessment data are the program constituency. The Computer Science Program constituents fall into the following categories:

- Faculty,
- Students,
- Graduates/Alumni,
- Employers of the Graduates
- Computer Science Industry Advisory Board
- Computer Science Club
- AAMU Office of IRPSP (Institutional Research, Planning and Sponsored Programs)

All constituents are involved in the program's 'Continuous Improvement' process. A database consisting of the names and contact information of all the constituents will be maintained.

Assessment Tools and Data:
The data used and the assessment tools to collect the data for Assessment include:

1. Course Grades
2. Post-semester course Assessment by the Faculty
3. Course Student Learning Outcomes Assessment Tool
4. Program Outcomes Assessment Tool
5. Exit examination for Graduating Seniors
6. Major Field Test for Graduating Seniors
7. Questionnaires/surveys,
    a. Graduating Senior Surveys
    b. Alumni Surveys
    c. Employer Surveys
    d. Faculty Course Evaluation

The CS program, as part of the College of Engineering, Technology and Physical Sciences, has developed a set of common survey forms. These are used to collect and maintain a common database. Similarly, a common collection frequency and analysis approach is followed across the College of Engineering, Technology and Physical Sciences.

Frequency of Data Acquisition and Assessment:
Once Every Month

- Department Faculty Meetings
- Faculty Standing Committee Meetings

Once Every Semester

- Assessment of Program Outcomes
- Assessment of Student Course Learning Outcomes
- Post-semester course survey by faculty
- Course faculty evaluation by students
- Exit Examination
- Graduating Senior Survey
- Major Field Test

Once A Year

- Alumni Survey
- Industry Advisory Board Meetings

Once Every Two Years

- Employer Survey
- Assessment of Program Educational Objectives

Data Analysis:
Analysis of data is done at different levels (committee, program, school, and university), which leads to meaningful review for improvements of the program. The analysis of results in the

context of the criteria/target mentioned in rubrics leads to successful decision-making. The simplest form of analysis followed is frequency analysis.

Data Review and Actions:
The computer science faculty meets periodically to review and discuss the assessment data. Detailed minutes of those meetings are kept. Data is reviewed at the level required (for example, program committees or faculty) to make decisions about program changes for continuous program improvement. The faculty discusses the results using the a priori target levels established in the rubrics, with a goal to identification of a root cause for the result (short coming) that, in turn, may lead to a recommended course of action. During the faculty meetings the results are reviewed and the results of data analysis discussed, in order to identify program changes on the basis of constituent input and to get acceptance on the suggested changes. All the actions/changes resulting from these faculty reviews are documented.

Evaluation of Impact of the Actions:
A documented method in the approved assessment approach is used for evaluating the impact of any changes that are approved by the faculty with the constituent input. This method involves repetition of all the steps in the Continuous Improvement Process to measure, collect, analyze the data in the next cycle and document the impact. Based on these measurements evaluate whether to continue the changes in place further or modify the strategies.

Appendix A-2 Schedule of Assessment Activities

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
Continuous Improvement Tasks	**Spring**	**Fall**	**Spring**	**Fall**	**Spring**	**Fall**	**Spring**	**Fall**	**Spring**	**Fall**	**Spring**	**Fall**
Define/Update of Program Educational Objectives	x	x	x	x	x	x	x	x	x	x	x	x
Define/Update of Program Outcomes	x	x	x	x	x	x	x	x	x	x	x	x
Define/Update of Rubrics	x	x	x	x	x	x	x	x	x	x	x	x
Define/Update of Tools, Strategies	x	x	x	x	x	x	x	x	x	x	x	x
Course Student Learning Outcomes Assessment	x	x	x	x	x	x	x	x	x	x	x	x
Post-Semester Course Assessment by Instructor	x	x	x	x	x	x	x	x	x	x	x	x
Program Outcome Assessment	x	x	x	x	x	x	x	x	x	x	x	x
Exit Examination	x	x	x	x	x	x	x	x	x	x	x	x
Major Field Test	x	x	x	x	x	x	x	x	x	x	x	x
Graduating Senior Survey	x	x	x	x	x	x	x	x	x	x	x	x
Course Evaluation by Current Students	x	x	x	x	x	x	x	x	x	x	x	x
CS Industry Advisory Board Meeting	x		x		x		x		x		x	
Alumni Survey	x		x		x		x		x		x	
Employer Survey			x				x				x	
Program Outcome Evaluation	x	x	x	x	x	x	x	x	x	x	x	x
Program Educational Objective Evaluation			x				x				x	

Appendix B – Course Syllabi

NOTE: The following syllabi have been modified from their original format to satisfy the format requested by ABET in the Self-Study Template document. The original syllabi are available in the course folders.

SYLLABI for CS Courses

The following course syllabi are listed, in order:

Required

CS 102 Introduction to Programming I
CS 104 Introduction to Comp & Ethics
CS 109 Introduction to Programming II
CS 203 Discrete Structures
CS 206 Visual Programming I
CS 209 Introduction To Digital Logic Des
CS 215 Data Structures
CS 314 Advanced Program
CS 328 Object Oriented Design with UML
CS 381 Computer Organization
CS 384 Operating Systems
CS 401 Software Engineering
CS 403 Senior Problem
CS 405 LINUX with Application Programming
CS 410 Seminar
CS 425 Theory of Algorithms
CS 488 Introduction to Database Systems

Common Electives

CS 304 Introduction to Web Programming
CS 305 Numerical Methods
CS 306 Visual Programming II
CS 309 Computer Graphics
CS 311 Introduction to Simulation
CS 315 Introduction to Game Programming
CS 320 Introduction to Multimedia Authoring
CS 321 Principal Of Information Security
CS 386 Cryptography
CS 389 Programming in Robotics Systems
CS 408 Wireless Computing
CS 409 Introduction to Digital Image Processing
CS 414 Forensic Computing

CS 421 Computer Security
CS 435 Introduction to Bioinformatics
CS 440 Programming Languages
CS 450 Artificial Intelligence
CS 483 Compilers
CS 484 Internship
CS 485 Introduction to Data Communication & Networks
CS 490 High Performance Computing

SYLLABI for Non-CS Courses (Mathematics/Physics/Chemistry)

MTH 125 Calculus I
MTH 126 Calculus II
MTH 237 Linear Algebra
MTH 453 Probability and Statistics
PHY 101/101L Physical Science I
PHY 102/102L Physical Science II
PHY 213 Physics I
PHY 214 Physics II
CHE101/101L General Chemistry I
CHE102/102L General Chemistry II
BIO101/101L General Biology I
BIO102/102L General Biology II

Course Number and Name

CS 102 Introduction to Programming I

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Nelson Barnes

Textbook, Supplemental Materials

Programming and Problem Solving with C+, by Nell Dale & Chip Weems
ISBN: 978-0-7637-7156-0 (5th edition)
ISBN: 978-1-2840-2876-8 (6th edition)

Catalog Description

This course concentrates on the process of computer problem solving. The idea of an algorithm is covered and flow charting skills are taught as a means of logical problem solving. The core elements of high level language are also taught. The student is expected to solve routine programming problems

Prerequisites or Co-requisites

None

Required, Elective or Selected Elective (as per Table 5-1)

Required

Outcomes

Students completing this course will possess the following skills and competencies:

1. Understand the concepts of algorithm, computer program, high-level programming language, flow chats, and the brief history of C++
2. Understand the major components of computers and how they work together
3. Be able to enter, edit, compile, link, troubleshoot and run C++ programs
4. Understand the structure of a C++ program
5. Understand how to use different types of variables and constants
6. Understand the arithmetic operators and how to write and evaluate arithmetic expressions
7. Understand and be able to use standard I/O, file I/O, and library functions in C++ programs
8. Understand the logical operators and how to write and evaluate logical expressions
9. Understand and be able to use basic control structures (selection and looping) in C++ programs

Student Outcomes from Criterion 3 covered by this Course

Outcome 1a, 1c, 2a, 5a

List of Topics Covered

- Overview of Programming and Problem Solving
- C++ Syntax and Semantics, and the Program Development Process
- Numeric Types, Expressions, and Output
- Program Input and the Software Design Process
- Conditions, Logical Expressions, and Selection Control Structures
- Looping
- Additional Control Structures (continued)

Course Number and Name
CS 104 Introduction to Computers & Ethics
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Venkata Atluri
Textbook, Supplemental Materials
Computers Are in Your Future, 3rd Custom edition for AAMU (ISBN 978-1-269-95110-4) by Bill Daley et al.
Catalog Description
This course is designed to introduce students to fundamentals of computer science and technologies. Topics will cover brief history of computer and the information age, Algorithms, word processing, INTERNET access, operating system, computer structure, electronic storage, database fundamentals, computer network. Impact of computers on the individual and society and application of computer in different areas are also introduced.
Prerequisites or Co-requisites
None
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Understand the basic concepts of computer system, information processing cycle, major hardware components. 2. Understand the responsibilities of computing professions, social implication of computing, the ACM codes of conduct and acceptable use policies of workplace (the university). 3. Understand the ethical and legal basis for privacy protection and security issues on Internet and computer system. 4. Understand the basic concepts of intellectual property, the current copyright laws, and the software piracy. 5. Understand the basic concepts of intellectual property, the current copyright laws, and the software piracy. 6. Learn the functions of computer system software and their importance to computer systems and users, and be able to use the personal productivity software to solve given problems. 7. Learn the basic concepts and techniques in programming languages, algorithms, and program development life cycle
Student Outcomes from Criterion 3 covered by this Course
Outcome 1a, 6a, 6b
List of Topics Covered
• Computers & You • Computer Ethics I: Professional Ethics and social • Inside the System Unit • Input/Output and Storage • System Software • Networks: Communicating and Sharing Resources

- Wired and Wireless Communication
- The Internet and the World Wide Web
- Computer Ethics II: Privacy, Crime, and Security (Chapter 9 –Privacy, Crime, and Security)
- Computer Ethics III: Intellectual Property (Supplementary materials from the reference book and the Copyright Law of U.S.)
- Application Software: Tools for Productivity
- Programming Languages and Program Development

Course Number and Name
CS 109 Introduction to Programming II
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Nelson Barnes
Textbook, Supplemental Materials
Programming and Problem Solving with C+, by Nell Dale & Chip Weems ISBN: 978-0-7637-7156-0 (5th edition) ISBN: 978-1-2840-2876-8 (6th edition)
Catalog Description
A continuation of the subject matter of CS 102. More advanced programming concepts are covered here. Topics include control structures, arrays, procedures, files, and recursion. Several programming exercises are assigned.
Prerequisites or Co-requisites
Prerequisite: CS 102
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Understand how functions can be used to reflect the structure of a functional decomposition 2. Understand the difference between value and reference parameters and how to use arguments and parameters 3. Know what it means to use a global reference and how and when to use a value-returning function 4. Understand how encapsulation and information hiding are enforced by the C++ compiler 5. Understand the difference between the specification and the implementation of an abstract data type 6. Understand the structure of one-dimensional and two-dimensional arrays 7. Learn how to use arrays in solving problems 8. Learn the difference between structured programming and object-oriented programming
Student Outcomes from Criterion 3 covered by this Course
Outcome 1a, 1c, 2a, 5a
List of Topics Covered
• Functions • Scope, Lifetime, and More on Functions • Simple Data Types • Structured Types and Classes • Arrays • Object-Oriented Software Development • Pointers, Dynamic Data, and Reference Types

Course Number and Name
CS 203 Discrete Structures
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Willie Bossie
Textbook, Supplemental Materials
Discrete Mathematics and Its Applications, 7th Edition by Kenneth H. Rosen McGraw-Hill, 2012. ISBN 978-0-07-338309-5 **Reference** *Schaum's Outline of Theory and Problems of Essential Computer Mathematics* by Seymour Lipschutz McGraw-Hill. 1987. ISBN: 0-07-037990-4
Catalog Description
Introduction to the use of formal mathematical structures to represent problems and computational processes. Develop an understanding of how to read, understand, and construct mathematical proofs and theorems. Introduce various problem-solving strategies such as thinking algorithmically (iterative and recursive) to solving problems in computing applications. Topics covered include (1) functions, relations, and sets, (2) basic logic, (3) proof techniques, (4) basics of counting, (5) graphs and trees, and (6) number systems.
Prerequisites or Co-requisites
Prerequisite: CS 102
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Mathematical Reasoning: Ability to read, understand, and construct mathematical arguments and proofs. 2. Combinatorial Analysis: Techniques for counting objects of different kinds. 3. Discrete Structures: Abstract mathematical structures that represent objects and the relationships between them. Examples are sets, permutations, relations, graphs, trees, and finite state machines. 4. Algorithmic Thinking: Involves specifying algorithms, analyzing the memory and time required by an execution of the algorithm, and verifying that the algorithm will produce the correct answer. 5. Applications and Modeling: Understand and appreciate the wide range of applications of the topics in discrete mathematics and develop the ability to develop new models in various domains.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2a, 4a
List of Topics Covered
The Foundations Logic and Proofs Basic Structures : Set, Functions, Sequences, Sums, Matrices Algorithms

Number Theory and Cryptography Inductions and Recursion Counting Relation Graphs and Trees

Course Number and Name
CS 206 Visual Programming
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Yujian Fu
Textbook, Supplemental Materials
Daniel Liang, INTRODUCTION TO JAVA PROGRAMMING, Prentice Hall, 2012. (10^{th} ed.)
Catalog Description
This course introduces fundamental concepts of visual programming languages such as Visual Basic, Visual C#, or Visual Java. Emphasis will be placed on solving real world problems. Students will be asked to design and code using these languages in an efficient manner.
Prerequisites or Co-requisites
Prerequisite: CS 102
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Know the features of a new programming language Java. 2. Learn the basics of Java language constructs and concept of classes and objects. 3. Learn the first control structure of Java program, and visual objects. 4. Learn the second control structures loop in java. 5. Learn the concepts of Graphical User Interface and its design and implementation using different GUI elements in Java. 6. Learn to create stand-alone application programs in Java.
Student Outcomes from Criterion 3 covered by this Course
Outcome 1a, 1c, 5b
List of Topics Covered
• Introduction to Java – Features: Object-oriented programming – classes & objects, inheritance, encapsulation • Data types: Operators, Operator Precedence • Java Language • Classes and methods, Variables and constants • Methods • Creating classes • Classes and methods • Control Structures I: Selection statement: If-statement / Switch-statement • Control Structures II: Iteration statement • GUI – API, layout JPanel/Events • User-interface components • Menu, frame, stand alone application development

Course Number and Name
CS 209 Introduction to Digital Logic Design
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Alak Bandyopadhyay
Textbook, Supplemental Materials
Fundamental of Logic Design by Charles H. Roth Jr., 7th Edn, Thomson (Brooks/Cole) ISBN: 0-534-37804-8
Catalog Description
This course is designed to introduce the logic design concepts for both combinatorial and sequential circuits. The binary number systems, the Boolean algebra, concepts of optimization of logic equations using various methods are covered in depth. Various types of integrated systems and components such as flip-flops, registers, counters are covered. Students will learn the basics as well as implementation skills upon completion of this course.
Prerequisites or Co-requisites
Prerequisite : CS 203
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Understand and learn the basic number systems and binary arithmetic 2. Learn and understand basic logic operations and gates, and circuit design using these gates. 3. Learn and understand design optimization of logic gates using algebraic, graphical (K-Map) and tabular (Quine-McCluskey Method). 4. Learn and understand optimization using Karnaugh Map. 5. Learn and understand optimization using Quine-McCluskey and Petrick Method 6. Learn transient simulation analysis of logic circuits using timing diagram, and prediction of hazards in the circuit. 7. Learn and understand the design and functions of different small scale and medium scale integrated circuit design including multiplexer, decoder and encoder, read-only memory and other programmable logic devices. 8. Learn and understand design of basic memory units such as latches and flip-flops 9. Learn logic design using VHDL.
Student Outcomes from Criterion 3 covered by this Course
Outcomes 1b, 2a
List of Topics Covered
• Binary Arithmetic • Basic Logic Gates and Logic Equations • Boolean Algebra, Introduction to truth table, SOP and POS, Simplification • Factoring and Multiplication, Minterm and Maxterm Expansions, Min SOP and min POS • Algebraic and Graphical Method of Optimization of Logic Equations, K-Map

- Quine-McCluskey Method
- Petrick's Method
- NAND and NOR gates
- Timing Diagram and Hazards
- Programmable logic devices and components such as MUX, ROM, Decoder, encoder etc
- VHDL Design
- Latches and Flip-flops
- Registers and Counter Design
- Completion of Simulation Projects

Course Number and Name
CS 215 Data Structures
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Venkata Atluri
Textbook, Supplemental Materials
C++ Plus Data Structures, 5th edition by Nell Dale **(ISBN 978-1-449-64675-2), Jones & Bartlett Learning** Reference Books: **Algorithms, Data Structures and Problem Solving with C++**, by Mark A. Weiss, Addison-Wesley Publishing, Inc. **Understanding Program Design and Data Structures with C++**, by Kenneth A. Lambert and Thomas L. Naps, West Publishing Company
Catalog Description
This course concentrates on the ways data can be organized and accessed. The idea of abstract data types is introduced and real data structures such as lists, linked lists, record, stacks, trees, and graphs are explained in terms of their basic structure and in the ways that they can be used in practical programming problems. Several programming assignments are required.
Prerequisites or Co-requisites
Prerequisite: CS 109 or EE 109
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Learning the concepts of Software Engineering and Software Ethics 2. Understanding the concepts of Data Design and Implementation, Logical/application/ implementation level of a data structure and abstract data type. 3. Understanding and implementing the concepts of Lists, Stacks, Queues, Priority Queues, Heaps, 4. Graphs, and Trees and Sorting and Searching Algorithms.
Student Outcomes from Criterion 3 covered by this Course
Outcome 1c, 5a, 6a
List of Topics Covered
• Introduction to Data Structures • Object-oriented programming – classes & objects, inheritance, encapsulation • Software Engineering Principles and Ethics • Abstract Data Types • Lists • Array-based implementation • Pointer-based implementation • Queues • Priority Queues • Recursion

- Sorting and Searching Algorithms
- Heaps
- Trees

Course Number and Name
CS 314 Advanced Programming
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Muhammad Ghanbari
Textbook, Supplemental Materials
Visual C# 2015, An introduction to Object-oriented programming, 7th ED. *By Joyce Farrell* *Course technology publishing.* ***ISBN:13:978-1-285-09633-9*** ***Ref.*** *C# Programming: From Problem Analysis to Program Design 3rd ed.* by Barbara Doyle ***ISBN:*** 978-0538453028, Microsoft 2010 C#
Catalog Description
Introduces more advanced elements of programming, such as user interface design, event driven programming, object-oriented programming, web-based programming, computer graphics, and database access. Use of a development environment to design, code, test, and debug advanced programs, including multifile source projects. Also provide the opportunity for students to work as teams on application projects. Several programming assignments are required. Microsoft Visual Studio, C#, and the .NET Framework will be the programming environment for this semester.
Prerequisites or Co-requisites
Prerequisites: CS 109, 206
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
After building a solid programming foundation, Student will learn rapid application development techniques that can be used to build a number of advanced types of applications. 1. Introduction to computing and Programming 2. Data types and Expressions Methods and behaviors creating your own classes 3. Making Decisions, Repeating Instructions, Array, Advanced collections. 4. Introduction to Windows programming, Programming based on Events Advanced Object-Oriented programming features 5. Debugging and Handling exceptions, Working with Files, Working with Databases, Web-Based applications
Student Outcomes from Criterion 3 covered by this Course
Outcome 5c
List of Topics Covered
Introduction to computing and Programming Data types and Expressions Methods and behaviors Creating your own classes Making Decisions

Repeating Instructions
Array
Advanced collections
Introduction to Windows programming
Programming based on Events
Advanced Object-Oriented programming features
Debugging and Handling exceptions
Working with Files
Working with Databases
Web-Based applications
Project Assignment

Course Number and Name
CS 328 Object Oriented Design with UML
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Yujian Fu
Textbook, Supplemental Materials
Object-Oriented Modeling and Design with UML, Michael R Blaha and James R Rumbaugh, Prentice-Hall
Catalog Description
This course introduces students to UML (Unified Modeling Language) and its comprehensive notation for communicating the requirements, architecture, implementation, deployment, and states of a system. The students will learn both the concepts and hands-on skills of Object Oriented Analysis and Design using UML. The course also deals with the implementation of the UML design in a programming language.
Prerequisites or Co-requisites
Prerequisites: CS 109, 206
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Learn the fundamental concepts of object oriented design and Unified Modeling Language (UML). 2. Learn the concepts of structural diagrams and behavioral diagrams in UML. 3. Being capable of design large scale software (intensive) systems using the correct notations of UML. 4. Learn the techniques of translation from UML model to the object oriented programming language such as Java or C++ and is able to use CASE tools to translate the UML model to correct object oriented program.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b, 3a, 3b, 3c, 5c
List of Topics Covered
• Overview of Object-Oriented Programming and Design • Object-Oriented Programming Language (Basics) • Object-Oriented Programming Language (Advance) • Object-Oriented Development and Software Engineering • Introduction to UML • Class Modeling • Advanced Class modeling • State Modeling, review of mid-term • Advance State Modeling • Interaction Modeling • System Conception • Domain and Application Analysis • System and Class Design

- Implementation Modeling
- Introduction to Design Patterns
- Software development process
- Presentation Demo, Review

Course Number and Name
CS 381 Computer Organization
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Willie Bossie
Textbook, Supplemental Materials
• *Computer Organization and Architecture:Designing for Performance 9th Edition.* by William Stallings Pearson Education Inc, 2013. ISBN 978-0-13-293633-0 • *The Essentials of Computer Organization and Architecture 3th ed.* by Linda Null and Julia Lobur Jones and Bartlett Publishers. 2012. ISBN: 978-1-4496-0006-8
Catalog Description
The primary hardware and software components of a computer system are addressed in this course. Topics covered include digital logic and data representation, computer architecture and organization, interfacing and I/O strategies, memory architecture, functional organization, multiprocessing, performance enhancements, distributed architectures, devices, and directions in computing. The organization of the CPU, main memory, interrupts structure, and addressing techniques as well as assemblers and linker/loaders are also taught.
Prerequisites or Co-requisites
Prerequisite: CS 209
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Provides an overview of computer organization and architecture and how computer design has evolved. 2. Examines the major components of a computer and their interconnection with each other and the outside world. A detailed discussion of internal and external memory and input/output (I/O). 3. Reviews number systems, computer arithmetic, and digital logic. 4. Examines the internal architecture, organization, structure, and function of the processor. 5. Parallel Processing and Multicore Computers
Student Outcomes from Criterion 3 covered by this Course
Outcomes 1b, 7c
List of Topics Covered
• Computer Evolution and Performance • A Top-Level View of Computer Function and Interconnection • Cache Memory • Internal Memory • External Memory • Input/Output

- Number Systems
- Computer Arithmetic
- Digital Logic
- Instruction Sets: Characteristics and Functions
- Parallel Processing
- Multicore Computers

Course Number and Name

CS 384 Operating Systems

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Willie Bossie

Textbook, Supplemental Materials

- *Operating System Concepts 9th ed.*
  by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne
  John Wiley & Sons, Inc., 2013. ISBN 978-1-118-06333-0
- *Modern Operating Systems, 2nd ed.*
  by A.S. Tanenbaum
  Prentice Hall. 2001. ISBN: 0-13-031358-0

Catalog Description

The use of the operating system and other software systems is the core content of this course. Topics include tasking and processes, scheduling, task coordination, device management, file systems, security, and networking.

Prerequisites or Co-requisites

Prerequisite: CS 381

Required, Elective or Selected Elective (as per Table 5-1)

Required

Outcomes

1. To explain what operating systems are, what they do, and how they are designed and constructed.
2. Describe the process concept and concurrency, threads, synchronization, and CPU scheduling as the heart of modern operating systems.
3. Explain the management of main memory during the execution of a process and the many different memory-management schemes.
4. Understand how the file system, mass storage, and I/O are handled in a modern computer system, Professional and ethical responsibility for computer scientists.
5. An overview of virtual machines and their relationship to contemporary operating systems.
6. Provide an understanding of the core ideas of distributed computing. To understand the LINUX operating systems, what it does, and how it is designed and constructed.

Student Outcomes from Criterion 3 covered by this Course

Outcomes 1b, 4b, 6a, 7b

List of Topics Covered

- Operating-System Structures
- Processes
- Threads
- Process Synchronization
- CPU Scheduling
- Deadlocks
- Main Memory

- Virtual Memory
- Mass-Storage Structure
- File-System Interface
- I/O Systems
- Material on Ethics
- Virtual Machines
- The Linux System
- Distributed Systems

Course Number and Name
CS 401 Software Engineering
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Nelson Barnes
Textbook, Supplemental Materials
Software Engineering: A Practitioner's Approach, 7th ed. by Roger S. Pressman ISBN: 978-0-07-337597-7
Catalog Description
This course covers the ideas involved in large scale programming design. The software life cycle is covered along with design specifications, verification and validation, and the use of various supporting CASE tools. The student is expected to design and document a software system of some kind and may be asked to code some of the design.
Prerequisites or Co-requisites
Prerequisite: CS 384
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
Students completing this course will possess the following skills and competencies: 1. Understand what is meant by software engineering and be able to describe the software engineering life-cycle model 2. Be able to describe the capability maturity model (CMM) 3. Be able to estimate the size and cost of building a software product 4. Appreciate the need for good programming practices, programming standards, and ethical standards 5. Understand and perform the requirements workflow 6. Understand and perform the design workflow 7. Understand the importance of CASE tools 8. Understand the importance of Software Ethics
Student Outcomes from Criterion 3 covered by this Course
Outcomes 3a, 3b, 3c, 5b, 5c, 6a, 7a
List of Topics Covered
• The Scope of Software Engineering and Software Ethics • Software Life-Cycle Model • The Software Process • Planning and Estimating • Requirements • Design • More on UML • Classical Analysis • Object-Oriented Analysis

Course Number and Name
CS 403 Senior Problems
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Nelson Barnes
Textbook, Supplemental Materials
Software Engineering: A Practitioner's Approach, 7th edition by Roger S. Pressman ISBN: 978-0073375977
Catalog Description
During this course, the student is expected to code a single, meaningful project begun earlier in CS 401 and present the results of this project in class. This project must meet set standards of design and documentation. Topics of professional ethics and responsibilities will also be discussed.
Prerequisites or Co-requisites
Prerequisite: CS 401
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
Students completing this course will possess the following skills and competencies: 1. Understand the importance of a well-organized team 2. Understand what needs to be tested and how to effectively perform several different testing techniques 3. Be able to explain why reuse is important and understand how to integrate reuse during design 4. Appreciate the need for good programming practices and programming standards 5. Understand the implementation workflow 6. Understand the skills needed for maintenance and the challenges of maintenance 7. Understand the importance of CASE tools 8. Appreciate the importance of updating and tracking estimates
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b, 3a, 3b, 3c, 4b, 5c, 7a
List of Topics Covered
• Teams • The Tools of the Trade • Testing • Reusability and Portability • Implementation • Post-delivery Maintenance • Code Reviews • Testing Dry Runs • Project Presentations and Acceptance Testing • Documentation Review and Updates

Course Number and Name
CS 405 Linux with Application Programming
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Muhammad Ghanbari
Textbook, Supplemental Materials
SUSE Linux Enterprise Server Administration, 2nd Edition 2011, by Novell & Jason Eckert. ISBN-10: 1111540039. ISBN-13: 978-1111540036
Catalog Description
This course deals with advanced skills related to Linux operating systems, programming environments, interfaces, programming tools, and utilities. This course will offer detailed programming/scripting skills using different shells, viz., Bourne, C Shell, Bash, tcsh, Perl, etc. In this course, the students will learn Linux virtualization and emulation, GNU tools, sockets programming.
Prerequisites or Co-requisites
Prerequisite: CS 384
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
Students will 1. Learn the history of Unix & Linux 2. Learn about shell commands 3. Learn about regular expression, using Grep and VI editor 4. Learn about Bourne shell interactive and programming 5. Learn Linux Files & Directories 6. Learn about C and TC shell interactive and programming 7. Learn about Korn shell interactive and programming 8. Learn about Bash interactive and programming
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b
List of Topics Covered
• Introduction to Linux • Command Basics • Linux Files & Directories • Introduction to Linux Shell • Regular Expressions • Using Grep & VI • Bourne Shell – Interactive & Programming • C and TC Shells – Interactive Programming • Korn Shell – Interactive and Programming • Bash – Interactive & Programming

Course Number and Name
CS 410 Seminar
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Jay Gangasani
Textbook, Supplemental Materials
• Writing and Speaking in the Technology Professions: A Practical Guide By David F. Beer (Editor), ISBN:978-0-471-44473-2, publisher: WILEY.com • *Lessons from the Edge of Technology* by James R. Chiles, Collins; Reprint edition, ISBN: 0066620821. (Link to the book on Amazon.com and at the publisher's website) • Documentaries and online material for which links will be provided on the class web page.
Catalog Description
This course is intended to enhance students' overall skills towards professional development. This includes writing and presenting technical papers utilizing technical digital/library resources, attending lectures from experts in the industry, visiting computer science related industries. The students will also get the opportunity to work in a team on application projects. The topics will be based on current trends in the industry.
Prerequisites or Co-requisites
Prerequisites: CS 314, 381
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Students will demonstrate critical knowledge, techniques, and tools of the discipline. 2. Students will apply appropriate and emerging mathematics, computer science, and engineering technologies to solve problems 3. Students will work as team members and with team leaders 4. Students will have documented abilities for writing and presentation skills 5. Students will apply one or more modern computer languages to problem solving 6. Students will clearly express the basis for responsible and ethical behavior in their profession and recognize the need for it 7. Students will be able to implement concepts in software engineering, operating systems, computer architecture, and algorithm analysis
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b, 3a, 3b, 3c, 4a, 4b, 6b
List of Topics Covered
• How to Read, Write & Present, Principles of Communication • Getting started Writing the First Drafts • Construction and Content: Putting documents together

- Text and Graphics: presenting information Visually
- Manuals and Procedures: Giving Directions that Work
- Read and Critique technical material effectively
- Attending Lectures from Industry Experts
- Proposals: Writing to win the Customer
- Active Participating in Lectures
- Exposure to Industry Environment
- Involve in Team Project, involving current Technology
- Work in Teams to brainstorm on ideas for a substantial team project that you might carry out in CMP 410.
- Technical Writing & Oral Presentation Skills, all in Computer Specific Environment.
- Familiarity With professional Standards, practices, regulations & ethical issues in a Computer Science and Engineering specific environment, professional organizations (ACM/IEEE), postgraduate education and continuing education opportunities.
- Familiarity With professional Standards, practices, regulations & ethical issues in a Computer Science and Engineering specific environment, professional organizations (ACM/IEEE), postgraduate education and continuing education opportunities.

Course Number and Name
CS 425 Theory of Algorithms
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Alak Bandyopadhyay
Textbook, Supplemental Materials
Bundle of Algorithms in C++, parts 1-5, by Robert Sedgewick, 3rd Edn. Addison Wesley, 0-201-72684x
Catalog Description
Formal properties of algorithms are covered here. The use of big O notation is covered, along with its use in algorithm analysis. Other topics include recursion, finite automata, and NP complete problems. Examples of several routine algorithms such as searching and sorting are done and assigned as programming projects.
Prerequisites or Co-requisites
Prerequisites: CS 215 and MTH 126
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
1. Understand and implement Iterative and Recursive Algorithms 2. Understand and Learn concepts of functions, asymptotic notations and runtime 3. Should be able to learn, understand and implement various sorting algorithms 4. Understand, learn and implemnt various searching algorithms using binary search tree, binary tree and hashing 5. Understand and Learn Graph Theory and its Applications 6. Understand and Learn Recurrence Relations and Methods of Solving them 7. Understand and Learn Dynamic Programming Concepts and Implement them in various problem solving. 8. Implementation of algorithms using C++
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2a, 2b, 3a, 3b, 4a, 4b, 3c, 7d
List of Topics Covered
• Recursive vs Iterative Algorithms • Runtime Concepts, basic functions used, sorting algorithms introduced. • Use of divide and conquer principles in sorting: Merge Sort and Quick Sort Algorithms • Heap and Heap Sort • Searching Algorithms (Binary Search and Binary Search Tree) • Hashing, Graph Theory • Graph Theory continued • Applications of Graph Theory, Greedy Algorithms • Dynamic Programming • Dynamic Programming • Pattern Matching Algorithms • Applications of Pattern Matching

Course Number and Name

CS 488 Introduction to Database Systems

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Albanie T. Bolton

Textbook, Supplemental Materials

Database Systems: Design, Implementation & Management, 11th Edition, 2014
Modern Database Management 11th ed. www.cengage.com
ISBN-10: 1285196147
ISBN-13: 978-1285196145

Catalog Description

A study of the basic issues in database design, including database interfaces, data structures used the relational model, and query languages. A commercially available database package will be used to give students exposure to these concepts.

Prerequisites or Co-requisites

Prerequisite: CS 215

Required, Elective or Selected Elective (as per Table 5-1)

Required

Outcomes

Students completing this course will possess the following skills and competencies:

1. Understand the basic terminologies, components and architectures of Database Systems.
2. Understand and analyze the data models, the Relational Database Models and Entity Relationship (ER) Modeling.
3. Understand normal forms, apply transformation between normal forms and implement Normalization of Database Tables to produce a good database design.
4. Understand and implement Transaction Management, Distributed Database Management, and Database Administration.
5. Understand and implement Structured Query Language (SQL) for data administration, data manipulation and information extraction from database systems.

Student Outcomes from Criterion 3 covered by this Course

Outcomes 2b, 3a, 3b, 3c, 4b

List of Topics Covered

- Database & Database Users
- Database System Concepts and Architecture
- Database Modeling using Entity-Relationship Model
- Enhanced Entity Relationship Model
- Relational Model: Concepts, Constraints, languages,
- design, and programming: The Relational Data Model and
- Relational Database Constraints
- The Relational Algebra and Relational Calculus
- Relational Database Design by ER-and EER-to-Relational Mapping
- SQL-99: Searching Definition, Constraints, Queries, and Views

- Introduction to SQL Programming techniques
- Fundamental dependencies and Normalization for Relational databases
- Relational Database Design Algorithms and Further Dependencies
- Practical database Design Methodology and use of UML Diagrams
- Disk storage, Basic File Structures, and Hashing
- Indexing Structures for Files
- Algorithm for Query processing and Optimization
- Physical Database Design and Tuning
- Introduction to Transaction Processing Concepts and
- Concurrency Control Techniques
- Database Recovery Techniques
- Concepts of Object-Oriented Databases
- Object-Relational and Extended-Relational Systems
- Database Security Ethic
- Enhanced data Models for Advanced Applications
- Distributed database and Client/Server Architectures
- XML: Extensible Markup Language
- Data Mining Concepts
- Overview of Data Warehousing and OLAP
- Emerging Database Techniques and Applications

Course Number and Name
CS 304 Introduction to Web Programming
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Jay Gangasani
Textbook, Supplemental Materials
Programming the World Wide Web, 8/E, 2009, by Robert W. Sebesta, ©2015 | Pearson | Paper; 792 pp | Available ISBN-10: 0133775984 | ISBN-13: 9780133775983 Textbook web site: http://www.PearsonHigherEd.com/educator/product/Programming-the-World-Wide-Web-2009/9780136076636.page
Catalog Description
This course is designed to introduce undergraduate students to the basic concepts of the World Wide Web (HTTP, HTML, browser software), languages and techniques used for web programming (for example: HTML, XHTML, CSS, JavaScript and XML), data transfer over the web (associated tools and techniques), and the tools available in the web environment. By the end of the course the students are expected to learn programming in HTML, XHTML, CSS, JavaScript and XML and to be able to develop interactive web pages and applications.
Prerequisites or Co-requisites
Prerequisite: CS 102
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
To familiarize the students with essential Web programming concepts for developing Web sites as stated above. Upon completing this course, students are expected 1. to know these concepts such as Web server sites and Web client browsers, and to be able to browse or visit Web sites using different browsers, doing search and research with most useful web sites; 2. to know and be able to do client-side programming using HTML, XHTML, CSS, JavaScript, and XML; 3. To know the concepts of server-side programming such as PHP and ASP.NET; 4. Students should be able to use Browser Scripting languages such as JavaScript and to add interactivity to HTML pages, do simple programming, react to events, validate data, etc; 5. to use multimedia-handling languages such as Flash to handle Multimedia data on the Web; 6. to use Server Scripting languages such as PHP, ASP, and ASP.NET to make dynamic and interactive Web pages and to support access to relational databases such as MySQL, Oracle, and Sybase.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b
List of Topics Covered

- Brief Introduction to the Internet
- The World Wide Web
- Intro. to www.w3schools.com
- Multipurpose Internet Mail Extensions
- The Hypertext Transfer Protocol
- Security
- The Web Programmer's Toolbox
- HTML on www.w3schools.com
- Introduction to XHTML
- Origins and Evolution of HTML and XHTML, Basic Syntax
- Standard XHTML Document Structure
- Basic Text Markup, Images, Hypertext Links, Lists, Tables, and Forms
- Cascading Style Sheets
- Levels of Style Sheets, Style Specification Formats, Selector Forms, Property Value Forms
- Cascading Style Sheets Font Properties, 3.7. List Properties, Color, and Alignment

Course Number and Name
CS 305 Numerical Methods
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Alak Bandyopadjhyay
Textbook, Supplemental Materials
Elementary Numerical Analysis 3rd ed. (ISBN 978-0- 471-43337- 8) by Kendall Atkinson and Weimin Han **Reference book:** *Applied Numerical Methods with MATLAB for Engineers and Scientists* (McGraw-Hill, 2004. ISBN: 0-07- 2392-65- 7) by Steven C. Chapra
Catalog Description
This course will investigate the use of several fundamental algorithms to solve mathematical problems common to science and engineering applications. Methods illustrated will include numerical interpolation, integration, and the solution of differential equations. Programming assignments will be made to illustrate the numerical concepts.
Prerequisites or Co-requisites
Prerequisites: MTH 126/146 and CS 109
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Students should understand the basic math concepts such as significant digits, absolute and relative errors, rounding and chopping and Taylor Series 2. Students should understand and use root finding numerical methods such as Bisection method, Newtons' Method and Secant Method 3. Students should understand interpolation with polynomials and demonstrate interpolation with Lagrange form and Newton's form 4. Students should understand concepts with numerical integration, such as lower and uppers sums, definite and indefinite integrals, Trapezoid Rule or Romberg Algorithm 5. Students should understand systems of linear equations, and be able to apply basic methods such as Gaussian Elimination
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2a, 5a
List of Topics Covered
• C++ Review, Concept of Functions and Basics • Taylor Polynomials • Root Finding (Bisection Method) • Rootfinding (Newton's Method and Secants Method) • Error and Computer Arithmetic • Rootfinding • Interpolation and Approximation • Numerical Integration and Differentiation

- Solution of Systems of Linear Equations
- Ordinary Differential Equations

Course Number and Name
CS 306 Visual Programming II
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Yujian Fu
Textbook, Supplemental Materials
Cay S. Horstmann, Gary Cornell. Core Java Volume II-Advanced Features, Prentice Hall, 2008.
Catalog Description
This undergraduate course is designed to introduce advanced visual programming skills in Java platform. The main topics include Java network programming (RMI, servlets, socket programming), JDBC, Java Beans and EJBs, media and Java 2-D graphics. Students will learn to use Java technologies in the real world and write numerous, nontrivial programs throughout the semester to demonstrate mastery of the concepts discussed in the classroom.
Prerequisites or Co-requisites
Prerequisite: CS 206
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Learn advanced Swing and AWT and 2-D graphics design. 2. Learn textual and graphic animation. 3. Learn the concepts of network programming in Java, includes network concepts (IP, TCP, UDP), server side web programming, look up URL, and sockets and client.
Student Outcomes from Criterion 3 covered by this Course
Outcomes 1a, 1c, 5b
List of Topics Covered
• Introduction to Streams and files, test input and output • Reading and writing binary data, Object streams and serialization, File management • New I/O, Introducing XML, parsing XML doc, Using namespaces • Generating XML documents, Introduction to Network concepts, Connecting to a server • Implementing server, sockets , Sending emails, Making URL connections • Introduction to JDBC Structure of query language, JDBC configuration • Executing SQL statements, Query execution, Scrollable and updatable result sets • Transactions, Introduction to LDAP • Introduction to Javabeans, Bean-writing process, Using Beans to build simple application • Naming patterns for Bean properties and events, BeanInfo classes, property editors • JavaBeans persistence, Advance Swing: Lists • Advanced Swing: Tables, Trees, Text Components, Progress Indicators and component organizers.

- Advanced AWT: rendering pipeline, shapes, areas, strokes, paint
- Advanced AWT: Coordinate transformations, clipping, transparency and composition, rendering hints

Course Number and Name
CS 309 Computer Graphics
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Joel Fu
Textbook, Supplemental Materials
Computer Graphics with OpenGL by Donald Hearn, M. Pauline Baker, and Warren Carithers. 4th Edn, Pearson Prentice Hall
Catalog Description
Computer Graphics covers the means of visually displaying data. Hardware graphics systems are discussed, as well as the data structures and software techniques used in setting up graphical displays.
Prerequisites or Co-requisites
Prerequisites: CS 215, and MTH 237
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Grab the whole picture of computer graphics fields and applications. Understand the basic features of graphics hardware components and graphics software packages 2. Writing graphics applications with OpenGL and GLUT. Understand several complete line-drawing algorithms. Understand how OpenGL and GLUT functions work. 3. Learn how to implement graphics routines for some special application. Know techniques for using OpenGL to draw various primitives and the mouse and keyboard in an interactive graphics application. 4. Understand the underlying theory of transforming figures and Homogeneous coordinates. 5. Demonstrate the attitudes and skills required to adapt and adjust to a rapidly changing technological environment.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b, 4b
List of Topics Covered
• A Survey of Computer Graphics • Graphs and Charts, Computer-Aided Design, Virtual-Reality Environments • Data Visualizations, education and training, Computer Art, Entertainment, image processing, GUI • Overview of Graphics Systems • Graphics Output Primitives • Attributes of Graphics Primitives • Geometric Transformations • Two-Dimensional Viewing

Course Number and Name
CS 311 Introduction to Simulation
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Xiang Zhao
Textbook, Supplemental Materials
Simulation Using ProModel, 3rd Edition, (ISBN 13 9780073401300) by Charles R. Harrell Reference book: *Simio and Simulation: Modeling, Analysis, Applications (CPS1)* (ISBN 978-0073408927) by W. Kelton, Jeffrey Smith and David Sturrock
Catalog Description
The basics of simulating real world situations with the computer form the content of this course. Mathematical modeling is discussed; elements of probability and statistics, Monte Carlo sampling, and uses of simulation languages are also undertaken. Programming assignments are made to illustrate these basic concepts.
Prerequisites or Co-requisites
Prerequisite: CS 215
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Understand the essential concepts on simulations and system dynamics 2. Understand the concepts and techniques in discrete event simulation 3. Understand the concepts and skills for data collection and input analysis 4. Understand the model building and advance V&V techniques 5. Understand the concepts and techniques for output analysis 6. Understand the advance simulation optimization techniques and apply to the real-world system modeling
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b
List of Topics Covered
• Intro to Simulation • System Dynamics • Simulation Basics • Discrete Event Simulation • Data Collection and Analysis • Model Building • Model Verification and Validation • Simulation Output Analysis • Simulation Optimization • Real-world system modeling

Course Number and Name
CS 315 Introduction to Game Programming
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Willie Bossie
Textbook, Supplemental Materials
Learning to Program with Alice (w/ CD ROM), 3/Edition Wanda P. Dann, Stephen Cooper and Randy Pausch ISBN-13: 9780132122474 Prentice Hall 2012
Catalog Description
This course is designed to introduce undergraduate students to the basic concepts of game design and development, hands-on exposure to the different techniques used for game programming, implementation on different target devices/platforms using the available tools and programming languages such as C#, Java, Alice, or C++ in the game environment. By the end of the course the students are expected to learn the concepts of game design, development and implementation using different programming languages/tools available.
Prerequisites or Co-requisites
Prerequisites: CS 206, 215
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Knowledge of the .NET Framework, elements of a Alice program, developing a Alice program. 2. Knowledge of Alice variables, expressions, assignment, input and output, and methods and parameters, and data types. 3. Knowledge of Alice relational operators and expressions, if, if-else, if-else-if, nested-if, and switch statements, while loop, do while loop, for loop, AND, OR, NOT operators. 4. The object concept, introduction to object-oriented design, classes in Alice, using Alice objects, the string class, interfaces, and random numbers. 5. Knowledge of Alice arrays, single and multidimensional. 6. Knowledge about history of computer games, style of play, designing computer game, and the gaming industry. 7. Knowledge of different type of computer games. 8. Knowledge about technical aspect for programming computer games. 9. Knowledge about current and future trends in computer games. 10. To give students experience in preparing and presenting oral presentations as related to software engineering.
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b, 5c
List of Topics Covered
• Game Programming with Alice • Alice Programming Basics

- Alice Data Types
- Alice Statements
- Alice Classes, Objects & Methods
- Alice Arrays
- Game History and Genres, Game Play Styles, Design Teams, and Industry & Business & Jobs
- Emergence and Progression, Player Centric Design, Game Genres Shmups, and Game Genres Platforms
- Color, UML & XNA GSE. And Play Testing
- Game for Women and Girls, Violence in Games, and Future Direction for Computer Games
- Poster

Course Number and Name

CS 320 Introduction to Multimedia Authoring

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Willie Bossie

Textbook, Supplemental Materials

- *Multimedia Making It Work 8th Ed.*
  by Tay Vaughn
  978-0071748469 McGraw-Hill 2010
- *Internet & World Wide Web: How to Program, 4/E 2008*
  By (Harvey & Paul) M Deitel & Deitel, Prentice Hall
  ISBN-10: 0131752421. ISBN-13: 9780131752429

Catalog Description

This course focuses on the basic concepts of computer-based multimedia production. Topics included are essentials of interactive multimedia authoring, design planning of a multimedia production, building blocks for multimedia productions (text, graphics, sound and video), introduction to HyperCard and HyperCard objects (buttons, fields, card, background), use of Hypertalk programming language, and introduction to the Authorware authoring tool. Each student is required to complete a semester project.

Prerequisites or Co-requisites

Prerequisite: CS 215

Required, Elective or Selected Elective (as per Table 5-1)

Elective

Outcomes

Upon the completion of this course, the students are expected to achieve the following outcomes. In addition, this course will prepare the students to improve their performance on the MFT Performance Indicator of Discrete Structures. Some learning outcomes include:

1. Format and Design a Page (HTML5 and CSS3)
2. Design and Build Portfolio Website (web design principles: typography, color, layout, imagery, information design)
3. Design and Build Narrative Website (narrative design, information architecture, hypermedia, applying dynamic behavior)
4. Be able to plan, develop and edit multimedia animation and video
5. Be able to play and develop an interactive multimedia product/presentation

Student Outcomes from Criterion 3 covered by this Course

Outcomes 2b

List of Topics Covered

- Introducing Dreamweaver
- Touring Dreamweaver
- Setting Preferences
- Designing and Crafting Basic Pages
- Assessing the code directory
- Building Style Sheet Web Pages

- Working with Text, Inserting Images
- Establishing web links
- Adding Advanced Design Features
- Using Behaviors, Setting up Tables
- Interactive Forms

Course Number and Name
CS 321 Principles of Information Security
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Venkata Atluri
Textbook, Supplemental Materials
Principles of Information Security 4th ed. by Michael E. Whitman and Herbert J. Mattord, Cengage Publishing, 2012, ISBN 978-1111138219
Catalog Description
Introduce students to the principles of information security and assurance as applied to computer networks. This course includes the foundation for understanding the key issues associated with protecting information security assets, determining levels of protection and response to security incidents, and designing a consistent, reasonable information system with appropriate intrusion detection and reporting features. Students will be exposed to the spectrum of security activities, methods, tools, and procedures. Coverage will include inspection and protection of information assets, identification of appropriate pre/post-incident procedures, and technical/managerial responses.
Prerequisites or Co-requisites
Prerequisite: CS 104
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Learning the concepts and history of Information Security and Assurance 2. An Understanding of the Legal, Ethical, and Professional Issues in Information Security 3. Information Security Risk Management such as People, Process, and Technology 4. Learn to Identify and prioritize information assets and threats to those assets and the techniques to develop 5. Understanding the different security tools and technologies available 6. Learning to prepare for Security Control Assessments, Develop Security Assessment Plans, Conduct Security Control Assessments, Analyze 7. Learn the disaster recovery plan for recovery of information assets after an incident
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b, 6b
List of Topics Covered
• Introduction to Information Security and Information Assurance • History of Information Assurance • Principles of Security Assurance • Legal, Ethical, and • Professional Issues in Information Security • Information Security Risk Management – People and Process • Information Security Risk Management – Technology

- Information Security Plan – Identify and prioritize information assets and threats to those assets
- Security Tools and Technologies
- Implementing Information Security
- Incidents and Disaster Recovery

Course Number and Name
CS 386 Cryptogrophy
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Julius Jow
Textbook, Supplemental Materials
Introduction to Modern Cryptography – Jonathan Katz and Yehuda Lindell, Chapman and Hall, ISBN# 978-1- 58488-551- 1
Catalog Description
The objective of this course is to learn the concepts of cryptography, its applications and importance in cyber security. The course will cover the fundamental concepts of cryptography including historical background, number theory, encryption, authentication, public key cryptography, digital signatures and some modern cryptography principles.
Prerequisites or Co-requisites
Prerequisite: CS 203, 215
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Students will: 1. Will be able to understand and learn the fundamental concepts and techniques of modern cryptography. 2. Will learn the mathematical and algorithmic concepts for encrypting and decrypting messages and texts. 3. Will understand and learn the role of cryptography in computer and communication security. 4. Will learn and understand the concepts of message authentication codes and how to apply it. 5. Will be able to apply all the concepts learnt towards application problems through developing and use of appropriate computer programs.
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2a, 2b, 5c, 7d
List of Topics Covered
• Classical Encryption Technique • Block Ciphers and the Data Encryption Standard • Basic Concepts in Number Theory and Finite Fields • Advanced Encryption standard • Block Cipher Operation • Pseudorandom Number and Stream Ciphers • More Number theory, Prime numbers, Fermat's and Euler's Theorem • Public-key Cryptography and RSA • Other Public-Key Cryptosystems • Cryptographic Hash Functions • Message Authentication Codes • Digital Signatures

- Key Management and Distribution
- User Authentication

Course Number and Name
CS 389 Programming in Robotics Systems
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Willie Bossie
Textbook, Supplemental Materials
• *Java: Learning to Program with Robots*, Byron W. Becker, 2011. Ebook available. • *Robot Programming : A Practical Guide to Behavior-Based Robotics*, Joe Jones, Daniel Roth, 2003.
Catalog Description
This course is designed to introduce the programming concepts involved with autonomous robotics systems. The educational version and off-the-shelf robot kits will be provided and used for student projects and assignments. Students will design a simple robotic platform to meet specific goals. A common platform is used as practice environment for students to learn programming skills in robotics systems.
Prerequisites or Co-requisites
Prerequisites: CS 109 or 206
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
• Develop basic programming and software intensive system development skills and their relationship to robotics and embedded systems. • Understand communications and interfaces used in programming of robots. • Use robotics to solve simple and complex physical and virtual problems. • Understand limitations of small robotic (and embedded) systems. • Apply concepts of computer science to robot system programming. • Develop teamwork through competitions among groups of students.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b, 1b, 6a, 7b
List of Topics Covered
• Introduction to Robotic Systems • Sensors API and Programming on Sensors • Sensors API and Programming • Controller Design • Introduction to ROS • Programming in ROS • Robot Behavior Design • Behavior Programming • BP in the Robot Platform • Security, sensor security and Mobile Security in robotics systems

Course Number and Name
CS 408 Wireless Computing
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Yujian Fu
Textbook, Supplemental Materials
William Stallings. “Wireless Communications and Networks”. Prentice Hall
Catalog Description
Advances and new applications in the expanding field of telecommunications and wireless computing and networks are investigated. Methodologies and tools for network planning, implementation, management, maintenance, and security are described.
Prerequisites or Co-requisites
Prerequisite: CS 384
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Understand the wireless network topology and principles, the mechanisms for the wireless network communication. 2. Understand and be able to develop the software systems using programming languages and knowledge of wireless network and communication techniques. 3. Understand the principles, technologies and protocols of wireless LAN.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b
List of Topics Covered
• Wireless network, Wireless LAN, wireless transmission principles, Transmission fundamentals, data communication technology • Channel capacity and transmission media, Comparison of basic communication technologies • Packet switch, ATM; Project discussion • Review of midterm • TCP/IP protocol, programming, and format, Wireless networking • Satellite communication, encoding and error correction • Cellular wireless network • Mobile IP, wireless communication protocol • Wireless local area networking, technologies and approach for examination • Bluetooth techniques • Overview of wireless LAN and transmission technologies

Course Number and Name
CS 409 Introduction to Digital Image Processing
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Joel Fu
Textbook, Supplemental Materials
Rafael Gonzalez, Richard Woods, and Steven Eddins, Digital Image Processing using MATLAB, Prentice Hall. Rafael Gonzalez, and Richard Woods, Digital Image Processing, 2nd Edn. Prentice Hall.
Catalog Description
Focus on the fundamental concepts of image processing and computer vision; its principles in signal processing, the theory of feature extraction and image analysis, its relation to human vision and technology for implementation. Introduce students to MATLAB image processing toolbox. Students will understand how to acquire and process images, the nature and operation of basic image processing algorithms and their basis.
Prerequisites or Co-requisites
Prerequisite: CS215
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Students completing this course will possess the following skills and competencies: 1. Understand the basic concepts and methodologies for digital image processing, 2. Describe the characteristics of an image, 3. Be able to using MATLAB and IPT functions to develop new program to enhance and manipulate image data, and 4. Understand and be able to convert raw satellite data into an image. 5. Be able to select and apply appropriate image processing techniques in one or more application areas.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b, 3a, 3b, 3c
List of Topics Covered
• Introduction: What is Digital Image Processing • Background on MATLAB and Image Processing Toolbox • Digital Image Representation • Data Classes and Image Types • Intensity Transformations and Spatial Filtering • Frequency Domain Processing • Image Restoration • Color Image Processing • Image Compression: Fundamentals, Image Compression models • Image Segmentation

Course Number and Name
CS 414 Forensic Computing
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Venkata Atluri
Textbook, Supplemental Materials
Guide to Computer Forensics and Investigations by Bill Nelson, Amelia Phillips, Frank Enfinger, and Christopher Steuart, Course Technology, ISBN 13: 978-1-4180-6733-5, 2008 or ISBN 10: 1-4180-6733-4, 2007
Catalog Description
The course introduces the undergraduate students to the study of computer forensics, including the concepts, tools and techniques necessary for identification, retrieval, preservation, analysis and documentation of information from electronic media in matters of suspected unauthorized access to confidential information, intellectual property crimes, fraud, piracy, industrial espionage, decryption, destruction of information, etc. The course will incorporate demonstrations and laboratory exercises to reinforce practical applications of course instruction.
Prerequisites or Co-requisites
Prerequisite: CS 384
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Learning the history and importance of forensic computing 2. Understanding the concepts of confidential information, intellectual property crimes, fraud, piracy, industrial espionage, decryption, destruction of information, etc. and the role of computer forensics 3. Understanding the concepts and techniques of data retrieval and duplication for analysis. 4. Learning the concepts and techniques needed for forensic analysis and reporting. 5. Learning the algorithms necessary for information hiding
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b, 6b, 7b
List of Topics Covered
• Introduction to Forensic Computing • Understanding Information and Ethics • Law and Computer Forensics • Data Acquisition and Duplication • Computer Forensic Analysis and Validation • Forensic Report Writing • Steganography

Course Number and Name
CS 421 Computer Security
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Julius Jow
Textbook, Supplemental Materials
Alfred Basta, Nadine Basta and Mary Brown, Computer Security and Penetration Testing, 2nd Edition. Course Technology Incorporated, 2014, ISBN-10: 0840020937. ISBN-13: 9780840020932
Catalog Description
This course is designed to introduce undergraduate students to the basic concepts of computer security. The students will learn the tools and techniques that can monitor the system for activities by unwanted programs such as malware, adware, viruses, worms, trojans, etc. By the end of the course the students are expected to learn to use available tools as well as develop and implement programs using different programming languages, for computer security.
Prerequisites or Co-requisites
Prerequisite: CS 384
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Learning the concepts of Computer Security and understanding its history 2. Understanding the ethical issues and Learning the responsibilities as user/programmer 3. Understanding hands-on the vulnerabilities of different components of the system being used 4. Understanding the concepts of and Learning hands-on how to detect the system intrusion 5. Learning to use the different scanning tools and techniques for monitoring, mitigating threats 6. Understanding the different malicious programs that threaten the computer systems
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b, 6b, 7c
List of Topics Covered
• Introduction to Computer Security • Ethical Issues in Computer Security • Windows, Linux, Email, Internet Vulnerabilities • Intrusion Detection • Scanning Tools and Techniques • Sniffers and Spoofing • Malware – Viruses

Course Number and Name
CS 435 Introduction to Bioinformatics
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Venkata Atluri
Textbook, Supplemental Materials
Fundamental Concepts of Bioinformatics by Dan E. Krane & Michael L. Raymer, Benjamin Cummings, 2003, ISBN 0-8053-4633-3 **Reference** **Discovering Genomics, Proteomics & Bioinformatics** by A. Malcolm Campbell & Laurie J. Heyer, Benjamin Cummings, 2003
Catalog Description
This course is designed to introduce students to the fast emerging field of Bioinformatics that demands/consists of knowledge mainly from the areas of biology and computer science. The main objectives of this course are to prepare the students to analyze the vast biomolecular data and to develop necessary tools to analyze.
Prerequisites or Co-requisites
Senior Standing
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Understanding of the new field of bioinformatics and its Significance 2. Understanding of the theoretical background of the necessary biological data 3. Understanding of concepts of databases, and information retrieval 4. Understanding of the basics of programming and some programming constructs 5. Understanding of the importance of and the algorithms for sequence search 6. Understanding the concepts, importance and algorithms for gene indetification 7. Understanding of the concepts of and use of tools for the study of phylogenetics
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b, 4b
List of Topics Covered
• Introduction to Bioinformatics • Fundamentals of Biology • Fundamentals of Databases and Information Retrieval • Fundamentals of Computer Programming • Genome Sequences and Dynamic Programming • Genomics and Gene Recognition • Phylogenetics

Course Number and Name
CS 440 Programming Languages
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Alak Bandyopadhyay
Textbook, Supplemental Materials
Programming Language: Principles and Practices by Kenneth Louden, 3rd Edn., 2012
Catalog Description
In this course, comparisons are made between several modern programming languages. Language syntax, use, and structure are covered. Programming assignments in these languages are made.
Prerequisites or Co-requisites
Prerequisite: CS 314
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Understand the principles and components of programming language design, such as control structures, names, types, exceptions, etc. 2. Become familiar with the various schools or paradigms of programming languages, for instance functional languages. 3. Learn to use several programming languages by writing codes using them 4. Learn how to specify syntax and semantics for a language 5. Develop a rudimentary understanding of programming language implementation especially insofar as the implementation impacts language design. 6. Project Work through implementation and design to solve a problem.
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b
List of Topics Covered
• History on Programming Language • Language Design Principles • Syntax, and Syntax vs Semantics • Semantics • Data Types • Procedures and Environment • Abstract Data Types and Modules • Object Oriented Programming • Functional Programming: Concepts and Schemes • Functional Programming: Part II, ML, Delayed Evaluation and Haskell • Logic Programming

Course Number and Name

CS 450 Artificial Intelligence

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Joel Fu

Textbook, Supplemental Materials

Artificial Intelligence by Stuart Russell and Peter Norvig, Prentice Hall, Third Edition, 2010

Catalog Description

This is an introduction to the uses and techniques of artificial intelligence. Topics covered include knowledge representation, natural languages, machine learning, vision, and expert systems. Programming projects will be assigned.

Prerequisites or Co-requisites

Prerequisite: CS 215

Required, Elective or Selected Elective (as per Table 5-1)

Elective

Outcomes

1. Students can understand the main unifying theme: idea of an intelligent agent.
2. understand the role of learning as extending the reach of the designer into unknown environments
3. Know how that role constrains agent design, favoring explicit knowledge representation and reasoning
4. Treat robotics and vision not as independently defined problems, but as occurring in the service of achieving goals.
5. Build systems that perform well in unknown environments and unforeseen situations.
6. develop systems that exhibit "intelligent" behavior, without prescribing explicit rules
7. study core modeling techniques and algorithms from statistics, optimization, planning, and control and study applications in areas such as sensor networks, robotics, and the Internet

Student Outcomes from Criterion 3 covered by this Course

Outcome 2b, 4b, 7d

List of Topics Covered

- Summary Intelligent Agents
- Agents and Environments
- The Nature of Environments
- Searching for Solutions
- Uniformed Search Strategies
- Computer Vision and Neural Systems
- Computer Vision Fundamentals
- Neural Network Fundamentals
- Supervised Classifiers
- Feature Extraction

- Knowledge-Based Pattern Recognition
- Robotics

Course Number and Name

CS 483 Compilers

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Muhammad Ghanbari

Textbook, Supplemental Materials

Compilers Principles, Tehcniques and Tools
by Aho, Lam, Sethi and Ullman ISBN: 0-321-48681-1
Addison Wesley

Catalog Description

This course is a study of formal grammars, syntactic and semantic analysis, code generation, and other topics necessary to understand how compilers translate high-level languages into machine form. Programming projects are assigned.

Prerequisites or Co-requisites

Prerequisite: CS 215

Required, Elective or Selected Elective (as per Table 5-1)

Elective

Outcomes

By the completion of this course, students will be able to:

1. Design, implement a typical compiler
2. Explain the major functions of typical compiler issues related to the design and implementation of a compiler
3. Explain the inter-relationship between the different elements of a compiler
4. Explain issues in syntax and semantic of languages, specific basic performance criteria for compiler
5. Understand and analyze user needs for compiler
6. Generalizing the content of compiler design course to emphasize this broad applicability can make them
7. More relevant to students and especially, identify the new area which needs these topics to help them in their carrier.

Student Outcomes from Criterion 3 covered by this Course

Outcome 2b

List of Topics Covered

- Simple syntax-directed
- Lexical Analysis
- Syntax-directed Translation
- Intermediate Code Generation
- Run-Time Environment
- Code Generation
- Machine Independent Optimization
- Instructional Level Parallelism
- Optimizing for parallelism and Locality
- Interprocedural Analysis
- Case Studies

Course Number and Name
CS 484 Internship
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Joel Fu
Textbook, Supplemental Materials
NA
Catalog Description
The computer science internship program gives senior level students an opportunity to gain valuable, practical experience in the professional work environment. An internship consists of approved part-time employment over one semester with cooperation between the student's instructor and the employer for grading.
Prerequisites or Co-requisites
Prerequisite: CS 314 or Approval of Instructor
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Student will learn to appreciate the significance/importance of the concepts or knowledge units learned in the class room 2. Students will learn software scalability from class room programs to industry level programs 3. Student will learn the work place demands, communication, the capability to work in teams, and meet deadlines 4. Learning the basics of workplace expectations and demands; 5. Improved ability to make more informed job decision after graduation, learn how to share new things learnt with other peers
Student Outcomes from Criterion 3 covered by this Course
Outcome 2b
List of Topics Covered
• Remove the disconnect between WHAT undergraduates learn in the class and WHAT industry needs/wants them to know/learn • Provide the first-hand exposure to the industry way of designing and building systems • Provide exposure to the industry culture • After graduation, to move into the workforce smoothly and confidently • To bring the experience back to the classroom which helps improve the level of the course

Course Number and Name
CS 485 Introduction to Data Communications & Networks
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Muhammad Ghanbari
Textbook, Supplemental Materials
Introduction to Data Communication and Networks Business Data Networks and Telecommunications, 7th ed. By Raymond R. Panko ISBN: 978-0136153405 Prentice Hall
Catalog Description
This is a course covering data communications concepts and systems, communications networks, communication processors, network protocol, and local area networks.
Prerequisites or Co-requisites
Prerequisite: CS 381
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Student will: 1. Understand the history of networking 2. Explain the major functions of a networking system and describe issues relations to the design and Implementation of networking systems 3. Explain the inter-relationship between the networking system and the architecture of the computer network 4. Understand and analyze user needs for networking systems 5. Explain issues in distributed network system design 6. Specify basic performance criteria for network system
Student Outcomes from Criterion 3 covered by this Course
Outcomes 2b
List of Topics Covered
• Standards • Security which now permeates networking • Network Design and Management • Physical layer wired transmission • Single Switched Networks • Single Wireless Networks • TCP/IO Internet Standards in depth • Applications • Modulation

Course Number and Name

CS 490 High Performance Computing

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Xiang Zhao

Textbook, Supplemental Materials

- *Fundamentals of Parallel Processing* (ISBN 0-13-901158-7) by Harry Jordan, Gita Alaghband

Reference Books:

- *Parallel Programming with MPI* (ISBN 1-55860-339-5) by Peter Pacheco
- *Parallel Programming in OpenMP* (ISBN: 978-1-55860-671-5) by Rohit Chandra et al.

Catalog Description

This course serves as an introduction to the areas of parallel and structured computers. The course covers distributed computers in networks, multiprocessors, and pipelines. Architectural considerations, algorithm design, and performance measures are also covered.

Prerequisites or Co-requisites

Prerequisites: CS 215, 381

Required, Elective or Selected Elective (as per Table 5-1)

Elective

Outcomes

1. Understand the evolution of parallelism in computer architectures, concepts of parallel operations and data dependence.
2. Understand the vector processing architectures and algorithms, the concepts of SIMD, pipelines and their applications
3. Understand the MIMD architectures and shared-memory multiprocessing techniques. Apply the shared memory programming techniques to solving science and engineering problems.
4. Understand the distributed-memory MIMD architectures and message-passing techniques. Apply the distributed memory programming techniques to solve science and engineering problems.
5. Understand the static and dynamic interconnection networks with various topologies and properties.
6. Understand the data dependence and code optimization techniques in parallel processing. Be exposed to the advanced techniques in HPC, such as GPU programming, cloud computing and network security, etc.

Student Outcomes from Criterion 3 covered by this Course

Outcomes 2b, 4b

List of Topics Covered

- Parallel Machines and Computations
- Potential for Parallel Computations
- Vector Algorithms and Architectures
- MIMD Computers or Multiprocessors
- Distributed Memory Multiprocessors
- Interconnection Networks
- Data Dependence and Parallelism

Course Number and Name
MTH 125 Calculus I
Semester Credit Hours/Contact Hours per Week
4/4
Instructor Name
Fayequa B. Majid
Textbook, Supplemental Materials
Calculus, Larson and Edwards, 10th edition, 2013
Catalog Description
Limits; derivatives of algebraic, trigonometric, exponential, and logarithmic functions; applications of the derivative; differentials; maximum and minimum problems; curve sketching using calculus; and the definite integral and its applications to area. This is the first of three courses in the basic calculus sequence taken primarily by students in science, engineering and mathematics.
Prerequisites or Co-requisites
Prerequisite: MTH 113 or satisfactory placement test scores for all students except Engineering majors. The prerequisite for Engineering majors is MTH 115.
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
• To provide a careful study of calculus. Mastery of the concepts of calculus: functions, limits, continuity, differentiation, and integration. • To help the student acquire technical facility and an understanding of the uses and applications of calculus. • To help the student gain mathematical maturity.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Graphs and Models • Linear Models and Rates of Change • Functions and Their Graphs • Finding Limits Graphically • Finding Limits Analytically • Continuity and One-Sided Limits • Infinite Limits • Limits at Infinity • The Derivative and the Tangent Line Problem • Basic Differentiation Rules and Rates of Change • Product and Quotient Rules and Higher-Order Derivatives • The Chain Rule • Implicit Differentiation • Antiderivatives and Indefinite Integration • Area • Riemann Sums and Definite Integrals

- The Fundamental Theorem of Calculus
- Integration by Substitution
- The Natural Logarithmic Function: Differentiation
- The Natural Logarithmic Function: Integration
- Inverse Functions
- Exponential Functions: Differentiation and Integration
- Inverse Trigonometric Functions: Differentiation
- Inverse Trigonometric Functions: Integration
- Indeterminate Forms and L'Hospital's Rule
- Extrema on an Interval
- Increasing and Decreasing Functions and the First Derivative Test
- Concavity and the Second Derivative Test
- A Summary of Curve Sketching
- Differentials
- Optimization Problems
- Related Rates

Course Number and Name
MTH 126 Calculus II
Semester Credit Hours/Contact Hours per Week
4/4
Instructor Name
Fayequa B. Majid
Textbook, Supplemental Materials
Calculus, Larson and Edwards, 10th edition, 2013
Catalog Description
Applications of integration including volume, arc length and work; techniques of integration; infinite series; polar coordinates and polar graphs; vectors in the plane and in space, parametric equations; curves in the plane and in space; and lines and planes in space. This is the second of three courses in the basic calculus sequence.
Prerequisites or Co-requisites
Prerequisite: MTH 125 or 145
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
The students should be able to apply calculus to compute measure. They should have familiarity with the techniques of integration and series. They should have knowledge of parametric and polar curves. They should have introductory knowledge of vectors and the three-dimensional coordinate system.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Review of Derivatives • Review of Integrals • Integration by Substitution • Integration by Parts • Trigonometric Integrals • Trigonometric Substitution • Partial Fractions • Summary of Techniques of Integration • Improper Integrals • Area of a Region between Two Curves • Volume: the Disk Method • Arc Length • Plane Curves and Parametric Equations • Parametric Equations and Calculus • Polar Coordinates and Polar Graphs • Area in Polar Coordinates • Vectors in the Plane • Space Coordinates and Vectors in Space • The Dot Product of Two Vectors

- The Cross Product of Two Vectors in Space
- Lines and Planes in Space
- Sequences
- Geometric Series and the Divergence Test
- p-Series
- The Limit Comparison Test
- The Ratio Test
- Summary of Convergence Tests
- Taylor Polynomials
- Power Series
- Taylor and Maclaurin Series

Course Number and Name
MTH 237 Linear Algebra
Semester Credit Hours/Contact Hours per Week
4/4
Instructor Name
Fayequa B. Majid
Textbook, Supplemental Materials
Linear Algebra: A Modern Introduction.4th Edition, David Poole
Catalog Description
Introduction to theory of matrices, determinants, methods of solving the linear system **Ax = b** via Gaussian elimination, Gauss-Jordan elimination, eigenvalues and eigenvectors, diagonalization of matrices, real vector spaces, bases and dimension, linear transformations and inner product spaces. Additional topics may include quadratic forms and applications of matrix theory in solving differential equations.
Prerequisites or Co-requisites
Prerequisite: MTH 126 or 146
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
Students will know the various concepts of vectors and linear equations. Students will know the various methods for solving linear equations and matrices. They will be able to perform mathematical operations of matrices and understand the concepts of linear independence and linear combinations. They will be familiar with different applications of matrices such as the concepts of determinants, eigenvalues and eigenvectors, as well as similarity and diagonalization.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• The Geometry and Algebra of Vectors • Length and Angle: The Dot Product • Lines and Planes • Applications • Introductions to Systems of Linear Equations • Direct Methods for Solving Linear Systems • Spanning Sets and Linear Independence • Applications • Iterative Methods for Solving Linear Systems • Matrix Operations • Matrix Algebra • The Inverse of a Matrix • The LU Factorization • Subspaces, Basis, Dimension, and Rank • Introduction to Linear Transformations • Introduction to Eigenvalues and Eigenvectors • Determinants

- Eigenvalues and Eigenvectors of nxn Matrices
- Similarity and Diagonalization
- Iterative Methods for Computing Eigenvalues
- Applicatons and the Perron-Frobenius Theorem
- Orthogonality in R
- Orthogonal Complements and Projections
- The Gram-Schmidt Process
- Orthogonal Diagonalizaton of Symmetric Matrices

Course Number and Name
MTH 453 Probability and Statistics
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Fayequa B. Majid
Textbook, Supplemental Materials
Probability and Statistical Inference (8th Edition) by Robert Hogg and Elliot Tanis, Pearson.
Catalog Description
Probability axioms, methods of enumeration; conditional probability, independence, empirical frequency distribution, discrete and continuous random variables, expectation, moment generating functions, joint distributions, sums of random variables, and limit theorems.
Prerequisites or Co-requisites
Prerequisite: MTH 126 or 146
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Students are expected to state in layman terms the basic concepts of probability and statistics, define random experiment, random variable, sample space,, mean, variance, event, construct histogram and ogives, understand Bernoulli trial and moment-generating function, develop the geometric, binomial, negative binomial, and Poisson distributions, define random variable of the continuous type, develop and solve problems involving the uniform, exponential, gamma, normal and chi-square distribution, define multivariate distribution of the discrete and continuous type.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Basic Concepts • Properties of Probability • Methods of Enumeration • Conditional Probability • Independent Events • Random Variables of the Discrete Type • Mathematical Expectation • The Mean, Variance, and Standard Deviation • Bernoulli Trials and the Binomial Dist. • The Moment-Generating Function • The Poisson Distribution • Continuous-Type Data • Exploratory Data Analysis • Random Variables of the Continuous Type • The Uniform and Exponential Distributions • The Gama and Chi-Square Distributions

- The Normal Distribution
- Distributions of Two Random Variables
- The Correlation Coefficient
- Conditional Distributions
- The Bivariate Normal Distribution
- Functions of One Random Variable
- Transformations of Two Random Variables
- Several Independent Random Variables
- The Moment-Generating Function Technique
- Random Functions Associated with Normal
- The Central Limit Theorem

Course Number and Name
PHY 101 Physical Science I
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Padmaja Guggilla
Textbook, Supplemental Materials
"The Physical Universe" by K. B. Krauskopf, A. Beiser,Mc GrawHill Edition 13.
Catalog Description
A course covering force, motion, gravitation, energy, energy in action, electricity and magnetism, waves, the nucleus, and the atom.
Prerequisites or Co-requisites
Prerequisites: MTH 101. Co-requisite: PHY 101L
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Student will have the understanding of the fundamental units of measurement, velocity, force, Newton's laws, work, energy, gravity, Kepler's Laws, heat, electricity, reflection, refraction, atoms, nucleolus, lifetime etc. Student will understand (not memorize) the physical processes at work in the Universe, will develop the ability to solve problems, improve confidence and skills in quantitative expression, and build awareness of how science influences daily life.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Review of Basic mathematics • Scientific Method; Solar System • Gravitation, SI Units • Velocity Acceleration • Newton's Laws of Motion, Gravitation • Work, Power, Energy • Energy Transformations and Heat • Linear and Angular Momentum, Relativity • Fossil Fuels, Nuclear Energy, Fuel Cells • Temperature, Heat and Fluids • Kinetic Theory, Change of State and Thermodynamics • Electricity • Magnetism • Sound, Waves, Light, Optics • Radio Activity, Nuclear Energy • Quantumtheory and Hydrogen Atom

Course Number and Name
PHY 101L Physical Science Lab I
Semester Credit Hours/Contact Hours per Week
1/1
Instructor Name
Padmaja Guggilla
Textbook, Supplemental Materials
"The Physical Universe" by K. B. Krauskopf, A. Beiser,Mc GrawHill Edition 13.
Catalog Description
A laboratory course to accompany PHY 101, Survey of Physical Sciences I. This hands-on experience illustrates basic principles of measurements, kinematics & dynamics of motion, fluids, heat and thermodynamics, electricity and magnetism, optics, and matter.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisite: PHY 101
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Ability to use the basic measurement instrumentation, conducting experiments, analyzing the data and drawing conclusions.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Review of Basic Mathematics • Introduction to Basic Measurement Tools • Experiment 1: Measurements – Length, Mass, Volume, Density • Experiment 2: The Simple Pendulum – Mechanics • Experiment 3: Simple Harmonic Motion – Mechanics • Experiment 4: Archimedes' Principle • Revision of the Experiments • Experiment 5: Boyle's Law of Gasses • Experiment 6: Basic Measurement of Electroscope – Electrostatics • Experiment 7: Refraction and Reflection – Optics • Experiment 8: Ohm's Law – Electricity • Experiment 9: Longitude and Latitude • Revision of the Experiments

Course Number and Name
PHY 102 Physical Science II
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Padmaja Guggilla
Textbook, Supplemental Materials
"The Physical Universe" by K. B. Krauskopf, A. Beiser,Mc GrawHill Edition 13.
Catalog Description
A course encompassing selected topics in the field of chemistry, geology, meteorology, and astronomy. Topics to be covered include: the periodic law, crystals, ions, solutions, chemical reactions, the atmosphere and hydrosphere, earth materials, the changing crust, earth and the sky, the solar system, the stars, and the structure and evolution of the universe.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisite: PHY 102L
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Student will gain basic knowledge in the topics periodic law, crystals, ions, solutions, chemical reactions, the atmosphere and hydrosphere, earth materials, the changing crust, earth and the sky, the solar system, the stars, and the structure and evolution of the universe. Student will also have an understanding of physical processes, universe, and build awareness of how science influences daily life.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Review of Basic Chemistry • The Periodic Law • Chemical Bonds • Solids, Solutions • Acids and Bases • Quantitative Chemistry, Chemical Energy • Reaction Rates, Oxidation and Reduction • Carbon Compounds, Structures of Organic Molecules • Organic Compounds, Chemistry of Life • The Atmosphere, Weather • Climate, The Hydrosphere • Erosion, Volcanism • Tectonic Movement, Plate Tectonics, Methods of Historical Geology, Earth History • The Family of the Sun, The Inner Planets, The Outer Planets, The Moon • Tools of Astronomy, The Sun, The Stars, Life Histories of the Stars

Course Number and Name
PHY 102L Physical Science Lab II
Semester Credit Hours/Contact Hours per Week
1/1
Instructor Name
M. D. Aggarwal
Textbook, Supplemental Materials
“The Physical Universe” by K. B. Krauskopf, A. Beiser,Mc GrawHill Edition 13
Catalog Description
The laboratory course to accompany PHY 102 Survey of Physical Sciences. This hands-on experience illustrates basic principles of chemistry, geology, astronomy, and weather.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisite: PHY 102
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Ability to use the basic measurement instrumentation, conducting experiments, analyzing the data and drawing conclusions.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Review of Basic mathematics • Introduction to Basic Measurement Tools • Experiment 1: Chemistry: Periodic Table-elements • Experiment 2: Chemistry: The Chemical Reactions • Experiment 3: Chemistry: Oxidation & Reduction • Experiment 4: Geology: Identifications of Minerals • Experiment 5: Geology: Locating an Earth Quake • Experiment 6: Copper Plating (Electroplating) • Experiment 8: Space Science: Length of Day and Night

Course Number and Name
PHY 213 Physics I
Semester Credit Hours/Contact Hours per Week
4/4
Instructor Name
Anup Sharma
Textbook, Supplemental Materials
Fundamentals of Physics, 10th Ed. Halliday, Resnick and Walker
Catalog Description
This is the first part of a calculus-based physics course designed for sciences, engineering and technical majors. The goal is to acquaint students with the language, notation, and nature of physics. The approach to the mathematical solution of physics problems is strongly emphasized throughout the course. Topics to be covered will include mechanics, fluid heat, and thermodynamics. At least ten experiments will be performed by the student.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisite: MTH 125
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
Upon successful completion this course, the student will have acquired the following knowledge and skill to: 1. Demonstrate a comprehension of physical reality by understanding how fundamental physical principles underlie the huge variety of natural phenomena and their interconnectedness. 2. Demonstrate a comprehension of technology by understanding how things work on a fundamental level. 1. Build critical thinking and quantitative skills by gaining insight into the thought processes of physical approximation and physical modeling, by practicing the appropriate application of mathematics to the description of physical reality. 2. Demonstrate basic experimental skills by the practice of setting up and conducting an experiment with due regards to minimizing measurement error and by the thoughtful discussion and interpretation of data. 3. Demonstrate basic communication skills by working in groups on a laboratory experiment.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Introduction to Physics • Measurement • Motion Along a Straight Line • Vectors • Motion in two and three Dimensions • Forces and Motion – I

- Forces and Motion - II
- Kinetic Energy and Work
- Potential energy and Conservation of Energy
- Center of Mass and Linear Momentum
- Rotation
- Rolling, Torque, and Angular Momentum
- Gravitation
- Oscillations
- Waves - I
- Temperature, Heat, and the 1st Law of Thermodynamics

Course Number and Name
PHY 214 Physics II
Semester Credit Hours/Contact Hours per Week
4/4
Instructor Name
Anup Sharma
Textbook, Supplemental Materials
Fundamentals of Physics, 10th Ed. Halliday, Resnick and Walker
Catalog Description
The second part of a calculus–based physics course designed for sciences, engineering and technical majors. The goal is the same as for Physics 1. Topics to be covered will include electricity, magnetism, and light. At least ten experiments will be performed by the student.
Prerequisites or Co-requisites
Prerequisites: PHY 213. Co-requisite: MTH 126
Required, Elective or Selected Elective (as per Table 5-1)
Required
Outcomes
The primary goal of this course is to acquaint students with basic conceptual foundation of physics. It is designed to help students develop problem-solving skills. At the end of the course, each student should be able to demonstrate his/her understanding of electric and magnetic forces, fields, electrical potential, electrical energy, RCL circuits, Maxwell's equations, wave optics, mirrors and lenses. Upon completing this course, the students should be able to: • Define Coulomb's law and explore its properties • Explain electric field, electric force, electrical potential & electrical energy • Apply Gauss Law • Define capacitance and capacitors in series and parallel combinations as well as the stored energy. • Understand the sources and forces due to magnetic fields • Explain Faraday's law of electromagnetic induction • Understand the physical meanings of Maxwell's equations and their applications • Use the law of refraction and reflection to locate the images formed by mirrors and lenses
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Coulomb's Law • Electric Fields • Gauss' Law • Electric Potential • Capacitance • Current and Resistance • Circuits

- Magnetic Fields
- Magnetic Fields due to Currents
- Induction and Inductance
- Electromagnetic oscillators and Alternating Current/Maxwell's Equations

Course Number and Name
CHE 101 General Chemistry I
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Kamala Bhat
Textbook, Supplemental Materials
Chemistry and Chemical Reactivity by John C. Kotz, Paul M. Treichel, and Townsend (9^{th} Edition)
Catalog Description
A study of the fundamental laws of matter that govern physical and chemical changes. Atomic and molecular theories, atomic structure, periodic functions and classification of the elements are addressed. Required of all majors in chemistry.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisites: CHE 101L
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. To do critical thinking by applying fundamental principles used in Chemistry. 2. Develop skills to identify and write atomic structure, distinguish between the various types of bonding and intermolecular forces. 3. Develop oral, analytical and written communications skills by completing assignments. 4. General learning by applying chemical concepts to daily living. Students will develop the skill to interpret geometry of molecules based on the principles of VSEPR and Molecular orbital theories. 5. Teamwork by studying in groups.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Basic Tools: Chemistry, branches, hypothesis, theory, states of matter, matter and energy relation • Nature of substances, mixtures, types, separation of mixtures, purification, atoms . molecules, formula • Physical, Chemical properties, Physical chemical changes, intrinsic and extrinsic properties, • Quantitative Aspect: Fundamental units, MKS and SI system of units, mass, volume, volume of regular geometric figures, dimensional analysis and conversion units • Temperature and conversion, density • Atoms, Molecules and Ions (Continued) • Poly atomic ions and formula, Quantitative • Compounds (Continued) • Empirical and molecular formula • Moles, hydrated compounds, analysis ,

- Balance of reactions, naming of reactions
- Stoichiometry, limiting reagent and theoretical yield
- Percent yield, formula of compounds using analysis
- Solution Chemistry, balance equations name reactions,
- Analysis of samples using solution stoichiometry
- Relation between Mass-mole – molarity - volume
- Titration reactions to determine strength of solution
- Chapter 5 Heat and energy, state functions
- Specific heat, molar heat, first law of thermodynamics
- Calorimetry constant volume and pressure
- Heat of combustion, neutralization, heat of reaction , Hess's law
- Atomic structure ,
- Planck's equation, Bohr's model of an atom.
- Rydberg's equation, Energy of an atom, De Broglie's equation and Heisenberg's un-certainity principle, Schrodinger's equation
- Quantum numbers, Pauli's exclusion principle, Aufbau principle,
- Designations, electron configurations for valence electrons and orbital diagrams
- Know the relationship between quantum numbers and orbital shapes and orientations
- Periodic Table and its properties
- Periodicity and properties
- Know the periodic trends of size, IE and electron affinity
- Lewis Structure , VSEPR Theory
- Molecular geometry.

Course Number and Name
CHE 101L General Chemistry Lab I
Semester Credit Hours/Contact Hours per Week
1/1
Instructor Name
Kamala Bhat
Textbook, Supplemental Materials
N/A
Catalog Description
Laboratory to accompany CHE 101. Basic exercises in general chemistry, to include fundamental operations used in making scientific measurements; properties of gases, liquids and solids, chemical elements and compounds.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisites: CHE 101
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. Students will understand the basic structure of atoms, ions and molecules and ways to quantitatively describe these properties **2.** Students will understand the reactivity of atoms, ions and molecules, and the methods for describing chemical reactions **3.** Students will understand the concept of chemical equilibrium, and the energies that drive chemical reactions; an introduction to thermodynamics **4.** Students will understand the concept of chemical kinetics and the energy required to initiate a chemical reaction **5.** Students will understand the relationship between the electronic configurations of atoms and molecules and their chemical properties
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Generic Lab from Model Science – Information on how to use the Model science equipment and procedural + Intro to Balance lab • Separation of mixture, and additional separation techniques • Paper Chromatography - separation of components- purification technique • Gravimetric Analysis of chloride • Hydrate- % of hydrate in a compound • Double Displacement Reaction • Volume Lab Preparation of a solution • Standardization of base NaOH • Specific Heat • Heat of Neutralization • Plotting of graph using graph paper and on using excel

Course Number and Name

CHE 102 General Chemistry II

Semester Credit Hours/Contact Hours per Week

3/3

Instructor Name

Paul Okweye

Textbook, Supplemental Materials

1. John C. Kotz, Paul M. Treichel and John R. Townsend, Chemistry and Chemical Reactivity, 9th Edition, ISBN-13: 978-1-305-25665-1. (**Required)**
2. Online Web-based Learning (OWL) (**Suggested**, https://owl.cengage.com/)

Catalog Description

A study of radioactivity, solutions and electrolytes, ionization; properties, and reactions and uses of important metallic and non-metallic elements. The course includes an introduction to qualitative analysis.

Prerequisites or Co-requisites

Prerequisites: CHE 101,101L. Co-requisites: CHE 102L

Required, Elective or Selected Elective (as per Table 5-1)

Elective

Outcomes

Upon successful completion of this course, students will be able to:

a. Understand the basis of the gas laws and know how to use those laws (Boyle's law, Charles's law, Avogadro's hypothesis and Dalton's law).
b. Describe intermolecular forces and their effects.
c. Understand cubic unit cells; describe bonding in ionic and metallic solids; describe the properties of solids and interpret phase diagrams.
d. Calculate and use the solution concentration units molality and mole fraction
e. Understand rates of reaction and the conditions affecting rates.
f. Understand the nature and characteristics of chemical equilibria.
g. Use the Bronsted-Lowry and Lewis theories of acids and bases.
h. Understand the common ion effect, and
i. Understand the concept of entropy and its relationship to reaction spontaneity.

Student Outcomes from Criterion 3 covered by this Course

N/A

List of Topics Covered

- Concepts of Chemistry
- Gases and Their Properties
- Intermolecular Forces and Liquids
- The Chemistry of Solids
- Solutions and Their Behavior

- Chemical Kinetics: The Rates of Chemical Reactions
- Principles of Reactivity
- The Chemistry of Acids and Bases
- Principles of Reactivity: Electron Transfer Reactions

Course Number and Name
CHE 102L General Chemistry Lab II
Semester Credit Hours/Contact Hours per Week
1/1
Instructor Name
Paul Okweye
Textbook, Supplemental Materials
General Chemistry Laboratory Manual, By ***Paul Okweye*** and *Kamala Bhat*, 2nd ed., Thomson/Brooks/Cole Publishing, 2004. ISBN 0-534-62340-9
Catalog Description
Laboratory to accompany CHE 102. An introduction to quantitative and qualitative analyses. Acid-base titrations, reaction kinetics, and qualitative analyses of the elements are covered.
Prerequisites or Co-requisites
Prerequisites: CHE 101, 101L. Co-requisites: CHE 102
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
Upon completion of this laboratory, the student should be able to: 1. Solve quantitative chemistry problems and demonstrate reasoning clearly and completely. Integrate multiple ideas in the problem solving process. Check results to make sure they are physically reasonable. 2. Clearly explain qualitative chemical concepts and trends. 3. Perform laboratory techniques correctly using appropriate safety procedures. 4. Analyze the results of laboratory experiments, evaluate sources of error, synthesize this information, and express it clearly in written laboratory reports. 5. Maintain a laboratory notebook according to standard scientific guidelines. 6. Design, construct, and interpret graphs accurately. 7. Understand kinetics, equilibrium, acid and base reactions, pH, buffers, colligative properties, and electrochemical applications in an undergraduate laboratory.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Provide general information and details of lab requirements, Introduction to Generic Lab • Gas Laws Perform: Study of Compression of a Gas - E1 • Charles' Law – Effect of temperature on a Gas; Ideal Gas Equation • Dumas Method (Ideal gas equation): MOLAR MASS BY DUMAS METHOD • Iron (II) redox titration: REDOX REACTION : Fe/$KMnO_4$- SELF INDICATOR demo + theory(auto indicator) • Volumetric estimation of copper: REDOX REACTION – IODOMETRIC TITRATION ESTIMATION OF Cu • Reaction Kinetics in redox reaction: Introduction: RATE OF A CHEMICAL REACTION Demo Iodine clock reaction.

- Half life lab: HALF LIFE OF A NUCLEAR REACTION
- Spectrophotometer Lab -SPECTROMETRY AND MEASUREMENTS
- pH MEASUREMENTS USING COLOR as an indicator
- Acid base titration: pH Strong Acid /Strong Base pH WEAK ACID/STRONG BASE
- Acetate Buffer BUFFER SYSTEM: ACETATE BUFFER

Course Number and Name
BIO 101 General Biology I
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Florence Okafor
Textbook, Supplemental Materials
Biology: The Unity and Diversity of Life 14th Edition
Catalog Description
The first part of a full year's course in the biological sciences. The first semester is devoted to an investigation of basic biological concepts and their application to the variety of life. Selected examples from the major groups of animals and plants are used. For non-majors.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisites: BIO 101L
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. To do critical thinking by applying application of biological concepts. 2. Oral and written communication from assignments. 3. General learning, by applying applications of biological concepts to problems in daily living. 4. Teamwork by working in groups with some assignment
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Introduction: Concepts and methods in Biology • Chemical Foundation for Cells-atoms, molecules, and reactions • Carbon Compounds in Cells-organic compounds • Cell Structure and Function • Ground Rules of Metabolism • How cells acquire energy (Photosynthesis) • How cells release stored energy • Cell Division and Mitosis • Meiosis • Patterns of Inheritance • Human Genetic • Classification • Prokaryotes and viruses • Protists • Plant Life • Fungi • Animals Life (Invertebrate)

Course Number and Name
BIO 101L General Biology Lab I
Semester Credit Hours/Contact Hours per Week
1/1
Instructor Name
Florence Okafor
Textbook, Supplemental Materials
Laboratory Manual for General Biology for Starr's Biology Texts 6th Edition (REQUIRED) AUTHORS: Perry & Morton
Catalog Description
Lab designed to enhance and accommodate BIO 101. For non-majors majors.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisites: BIO 101
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. To do critical thinking 2. Oral and written communication 3. General learning 4. Team work
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• The Scientific Method & Measurement • Macromolecules & You: Food and Diet Analysis • Microscopy • Diffusion, Osmosis, and the Functional Significance of Biological Membranes • Structure & Function of Living Cells • Mitosis & Cytokinesis: Nuclear and Cytoplasmic Division • Meiosis: Basis of Sexual Reproduction • Heredity • Homeostasis • Enzymes: Catalysts of Life • Photosynthesis: Capture of Light Energy • Respiration: Energy Conversion

Course Number and Name
BIO 102 General Biology II
Semester Credit Hours/Contact Hours per Week
3/3
Instructor Name
Florence Okafor
Textbook, Supplemental Materials
Biology: The Unity and Diversity of Life 14th Edition
Catalog Description
A second semester course is devoted to the biology of humans. The problems of support, movement, supply of materials, distribution, waste removal, regulation and reproduction are described in detail. For non-majors.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisites: BIO 102L
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. To do critical thinking by applying application of biological concepts. 2. Oral and written communication from assignments. 3. General learning, by applying applications of biological concepts to problems in daily living. 4. Teamwork by working in groups with some assignment.
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Animal tissues and organ systems • Integration and control: Nervous systems • Sensory Reception • Integration and control: Endocrine systems • Protection, support and movement • Circulation: Blood and Cardiovascular System • Immunity • Respiration • Digestion and Nutrition • The Internal Environment: Urinary System • Human Reproduction and Development • Principles of Reproduction and Development

Course Number and Name
BIO 102L General Biology Lab II
Semester Credit Hours/Contact Hours per Week
1/1
Instructor Name
Florence Okafor
Textbook, Supplemental Materials
Laboratory Manual for General Biology for Starr's Biology Texts 6th Edition (REQUIRED) AUTHORS: Perry & Morton
Catalog Description
Lab designed to enhance and accommodate BIO 102. For non-majors.
Prerequisites or Co-requisites
Prerequisites: None. Co-requisites: BIO 102
Required, Elective or Selected Elective (as per Table 5-1)
Elective
Outcomes
1. To do critical thinking 2. Oral and written communication 3. General learning 4. Team work
Student Outcomes from Criterion 3 covered by this Course
N/A
List of Topics Covered
• Tissues • Muscles & Skeleton • Nervous System • Blood • Circulation • Respiration • Digestion • Urinary System • Immune System • Endocrine System • Animal Reproduction • Mammalian Anatomy

Appendix C-1 – Procedure Employed for processing, Analysis, and Use of CSLO and PO data

- The faculty follows the Course Assessment Schedule and each instructor teaching a course maintains the following: a relevant Course Student Learning Outcome Assessment Rubric, CSLO Assessment Tool, and Post-Semester Course Evaluation Tool.

- Course Student Learning Outcome Assessment Rubric: The rubric consists of the performance Indicators, and Performance Categories such as 1) Unsatisfactory (0% - <40%), 2) Satisfactory (40% - 80%), and 3) Above Satisfactory (80% - 100%), and Target values.

- Course Student Learning Outcomes (CSLOs) Assessment Tool: This tool consists different parts.

    - **Part A:** This part of the tool allows the Instructor to map the student's work such as homework, quiz, exams, projects, etc. that are to be considered for assessment by marking with a value of '1', to the CSLOs. The CSLOs used are from the course syllabus.
    - **Part B:** this part of the tool calculates the performance of each student for each of the Course Student Learning Outcomes based on 1) the student's performance in each of the submitted works (exams, test, home works, quizzes, etc) and 2) mapping of each of the works to the CSLOs (shown in part A of the tool).
    - **Part C:** This part of the tool distributes all the students under each CSLO into one of the three categories (A: Above Satisfactory, S: Satisfactory, U: Unsatisfactory) as per the criteria in the course rubric, or registers 'N' for the CSLO Not Measured.
    - **Part D:** This part of the CSLO tool implements the mapping of each of the CSLOs to POs as per the approved mapping (Appendix 8a).
    - **Part E:** Calculates the course's input to the Program Outcomes (Performance Indicators) based on the mapping of CSLOs to POs.
        - This part of the CSLO tool calculates the number of students that showed acceptable performance in the course as per the Course Rubric criteria.
        - It calculates the number of students under each Performance Indicator as per the CSLO and PO mapping
        - It calculates the Average Number of Students under each Performance Indicator.
        - It also registers the total number of students in the course being evaluated.
    - **Part F:** Calculation of the course's input to the Program Outcomes (Performance Indicators) based on the mapping of CSLOs to POs
        - This part of the CSLO tool calculates the number of students that showed acceptable performance in the course as per the Course Rubric criteria.
        - It calculates the number of students under each Performance Indicator as per the CSLO and PO mapping,
        - It calculates the Average Number of Students under each Performance Indicator.
        - It also registers the total number of students in the course being evaluated.

- Post-Semester Course Evaluation Tool: Using this tool the instructor identifies the shortcomings (section 3 of the tool) based on the performance categories (section 2) and the experiences during the semester, and also lists the corrective actions suggested or planned for the next time the course is offered.

- Program Outcome Assessment Tool: At the Program level, the program Outcome Assessment Tool is used to bring each course's data and calculate the performance at the Program Level.

    - The tool is linked to the each of the Course Student Learning Outcomes Assessment Tools and pulls data from the course assessment tools at the end of the semester.
    - It collects from each completed course, data such as the total number of students in the course, the number of students who met the a priori target criteria for each performance Indicator of the Program Outcomes.
    - It calculates the total students in the program reaching target and total number of students in the program evaluated for a given Performance Indicator.

- Charting and Reporting tools: A set of Charting and Reporting tools are used to display the data visually.
- Analysis and Use of Data: The charts and the data is analyzed and the based on the patterns, shortcomings, if any, are identified and possible performance improving actions are suggested/planned for the next cycle.

Appendix C-2 – Samples of Program Outcome Charting and Reporting Tools

a) Implements the Fall 2011 Program Outcomes

	Program Level Student Learning Outcomes						
	1	2	3	4	5	6	7
Percentage of Students Showing 'Satisfactory' or 'Above' Level Performance - FALL 2011	82%	83%	100%	65%	100%	92%	85%

b) Implements the Spring 2012 Program Outcomes with the added Performance Indicators

	Program Level Student Learning Outcomes (Performance Indicators)																	
	1a	1b	1c	2a	2b	3a	3b	3c	4a	4b	5a	5b	5c	6a	6b	7a	7b	7c	7d
Percentage of Students Showing 'Satisfactory' or 'Above' Level Performance - SPRING 2012	89%	64%	85%	83%	79%	96%	96%	97%	97%	98%	79%	95%	92%	68%	68%	95%	68%	88%	100%

c) Implements the charting and reporting of Fall 2011 and Spring 2012 (with the results of Performance Indicators grouped under eac Program Outcome for comparison of the two semesters).

	Program Level Student Learning Outcomes						
	1	2	3	4	5	6	7
FALL 2011 (Cycle 1)	82%	83%	100%	65%	100%	92%	85%
SPRING 2012 (Cycle 2)	81%	81%	95%	96%	88%	70%	87%

All the above tools (a-c) are linked to the Program Outcomes Assessment Tool and retrieve the assessment results for charting and reporting purposes.

Appendix C-3 – Course Student Learning Outcomes (CSLOs) Assessment Tool

Part A: Mapping of Students' work to the CSLOs.

	TOTAL # OF STUDENTS EVALUATED	21	1	1	1	1	1	1	1	1	1	1	1												1
last	first	ID	H1	H2	H3	H4	L1	L2	L3	L4	L5	Q1	Q2	Mid											Final
		1	22	18	13	14	20	23	22	45	19	45	40	84											103
		2	28	20	18	17	16	25	24	31	19	37	34	71											90
		3	28	20	18	17	16	25	23	31	20	44	40	87											94
		4	30			11	20					34		68											
		5	28	20	18	12	20	25	25	45	20	43	41	96											79
		6	28	18	19	15	18	25	24	22	14	46	45	80											87
		7	22	18	15	12		25	20		15		35	83											83
		8	24		15	16	18	21	22	0	19	31	39												
		9	19	14	14	12	17	22	15		20		38	61											78
		10	28	18					25	36		46	42	81											97
		11												49											
		12	20	16	16	10	18	24	18	45	15	29	31	67											74
		13	24	16	15	18	18	25		35		49	45	90											85
		14	18	10	20	16	18	25	22	45	20	46	36	84											87
		15	25		15	14	18	25	23		19	39	44	76											84
		16	28	20	19	20	20	25	23	45	20	48	48	100											101
		17	28	20	19	20	20	25	22		20	43	46	87											99
		18	23	14		8	19	25		45		37	39	95											94
		19	27	16	15			23	25	45				72											87
		20	26	16	15	15	18	25		35		33	41	91											82
		21	28	18	17		18	23	24	45	0	38	47	77											98
		Max Points Possible	30	20	20	20	20	20	25	40	20	50	50	100	50										100
		High	30	20	20	20	20	25	25	45	20	49	48	100	0		0	0	0	0	0	0	0	0	103
		Low	18	10	13	8	16	21	15	0	0	29	31	49	0		0	0	0	0	0	0	0	0	74
		Avg	25	17.18	16.5	15	18.4	24.2	22	37	17	40	41	79.95	#####		#####	###	####	#####	#DIV/0!	#DIV/0!	###	####	89
Student Learning Outcomes from the Course																									
Outcome	Description																								
1	Understand the basic concepts of computer system, information processing cycle, major hardware components.		1	1		1	1					1	1	1											1
2	Understand the responsibilities of computing professions, social implication of computing, the ACM codes of conduct and acceptable use policies of workplace (the university).		1				1			1		1		1											1
3	Understand the ethical and legal basis for privacy protection and security issues on Internet and computer system.			1							1		1												1
4	Understand the basic concepts of intellectual property, the current copyright laws, and the software piracy.											1		1											1
5	Understand the major concepts and technologies associated with Internet, Web, wired and wireless communication and computer networks.		1	1				1				1		1											1
6	Learn the functions of computer system software and their importance to computer systems and users, and be able to use the personal productivity software to solve given problems.				1				1	1		1		1											1
7	Learn the basic concepts and techniques in programming languages, algorithms, and program development life cycle										1														1

This part of the tool allows the Instructor to map the student's work such as homework, quiz, exams, projects, etc. that are to be considered for assessment by marking with a value of '1'.

The CSLOs used are as mentioned in the course syllabus. A sample page of the corresponding course syllabus is given below.

STUDENT LEARNING OUTCOMES

Upon the completion of this course, the students are expected to achieve the following outcomes:

Topic Area	Learning Outcome	Assessment Method
Chapter 1 – Computers & You Chapter 6 – Inside the System Unit	Understand the basic concepts of computer system, information processing cycle, major hardware components.	Homework, quiz, labs and exams
Ethics I: Professional Ethics and social implications (Chapter 1 and Spotlight 1)	Understand the responsibilities of computing professions, social implication of computing, the ACM codes of conduct and acceptable use policies of workplace (the university).	Homework, quiz, lab, and exams
Ethics II: Privacy, Crime, and Security (Chapter 9)	Understand the ethical and legal basis for privacy protection and security issues on Internet and computer system.	Homework, quiz and exams
Ethics III: Intellectual Property (Supplementary materials from the reference book and the Copyright Law of U.S.)	Understand the basic concepts of intellectual property, the current copyright laws, and the software piracy.	Homework, quiz, and exams
Chapter 2 –The Internet & the World Wide Web Chapters 3 & 8 – Wired & Wireless Communication and networks	Understand the major concepts and technologies associated with Internet, Web, wired and wireless communication and computer networks.	Homework, labs, quiz and exams
Chapter 4 – System Software Chapter 5 – Application Software: Tools for Productivity	Learn the functions of computer system software and their importance to computer systems and users, and be able to use the personal productivity software to solve given problems.	Homework, labs, quiz and exams
Chapter 11 – Programming Languages and Program Development	Learn the basic concepts and techniques in programming languages, algorithms, and program development life cycle	Homework, quiz, labs and exams

Course Student Learning Outcomes (CSLOs) Assessment Tool:

Part B: Calculation of each Student's Performance for each of the CSLOs

	TOTAL # OF STUDENTS EVALUATED	21	1	1	1	1	1	1	1	1	1	1	1											1		Student Learning Outcomes from the Course							
last	first	ID	H1	H2	H3	H4	L1	L2	L3	L4	L5	Q1	Q2	Mid											Final		1	2	3	4	5	6	7	8
		1	22	18	13	14	20	23	22	45	19	45	40	84											103		86.7%	93.6%	94.7%	92.6%	92.2%	93.1%	101.7%	0.0%
		2	26	20	18	17	16	25	24	31	19	37	34	71											90		80.3%	80.3%	85.6%	79.2%	84.7%	80.9%	90.6%	0.0%
		3	26	20	18	17	16	25	23	31	20	44	40	87											94		86.7%	86.2%	91.6%	90.0%	93.1%	86.7%	95.0%	0.0%
		4	30			11	20					34		68													41.6%	44.7%	0.0%	40.6%	41.3%	30.4%	0.0%	0.0%
		5	26	20	18	12	20	25	25	45	20	43	41	96											79		86.9%	91.5%	84.2%	87.2%	90.9%	91.3%	82.5%	0.0%
		6	26	18	19	15	18	25	24	22	14	46	45	80											87		86.4%	82.6%	88.3%	85.2%	88.8%	83.0%	84.2%	0.0%
		7	22	18	15	12		25	20		15		35	83											83		64.9%	55.3%	79.5%	66.4%	72.2%	60.0%	81.7%	0.0%
		8	24		15	16	18	21	22	0	19	31	39														32.6%	21.5%	30.5%	12.4%	23.6%	20.3%	15.6%	0.0%
		9	19	14	14	12	17	22	15		20		38	61											78		61.3%	51.5%	78.9%	55.6%	60.6%	50.1%	81.7%	0.0%
		10	26	18					25	36		46	42	81											97		80.0%	84.7%	82.6%	89.6%	84.4%	85.1%	80.6%	0.0%
		11												49													12.6%	14.4%	0.0%	19.6%	15.3%	14.6%	0.0%	0.0%
		12	20	16	16	10	18	24	18	45	15	29	31	67											74		67.9%	74.4%	71.6%	68.0%	71.9%	74.3%	74.2%	0.0%
		13	24	16	15	18	18	25		35		49	45	90											85		88.5%	88.5%	76.8%	89.6%	90.3%	81.8%	70.8%	0.0%
		14	18	10	20	16	18	25	22	45	20	46	36	84											87		80.8%	87.6%	80.6%	88.8%	84.4%	90.7%	80.2%	0.0%
		15	25		15	14	18	25	23		19	39	44	76											84		76.9%	71.2%	77.4%	79.6%	77.8%	70.7%	85.8%	0.0%
		16	26	20	19	20	20	25	23	45	20	48	48	100											101		98.7%	100.6%	99.5%	99.6%	100.6%	100.3%	100.8%	0.0%
		17	26	20	19	20	20	25	22		20	43	46	87											99		93.1%	81.5%	97.4%	91.6%	94.4%	80.6%	99.2%	0.0%
		18	23	14		8	19	25		45		37	39	95											94		84.4%	82.1%	77.4%	90.4%	90.0%	80.9%	78.3%	0.0%
		19	27	16	15			23	25	45				72											87		51.6%	67.9%	54.2%	63.6%	70.3%	72.6%	72.5%	0.0%
		20	26	16	15	15	18	25		35		33	41	91											82		82.6%	63.6%	73.2%	82.4%	85.3%	78.4%	68.3%	0.0%
		21	26	18	17		18	23	24	45	0	38	47	77											98		83.1%	89.4%	85.6%	85.2%	88.1%	89.3%	81.7%	0.0%
		Max Points Possible	30	20	20	20	20	20	25	45	20	50	50	100	50										100									
		High	30	20	20	20	20	25	25	45	20	49	48	100	0		0	0	0	0	0	0	0	0	0	100								
		Low	18	10	13	8	16	21	15	0	0	29	31	49	0		0	0	0	0	0	0	0	0	0	74								
		Avg	25	17.18	16.5	15	18.4	24.2	22	37	17	40	41	79.95	#####		#####	###	#####	#####	#DIV/0!	#DIV/0!	###	###	###	89	Average	83.41%	85.19%	86.28%	83.77%	88.28%	85.05%	88.45%	0.00%

This part of the tool calculates the performance of each student for each of the Course Student Learning Outcomes based on the student's performance in each of the submitted works (exams, test, home works, quizzes, etc.) and mapping of each of the works to the CSLOs (shown in part A of the tool)

Course Student Learning Outcomes (CSLOs) Assessment Tool:

Part C: Calculation of Performance Categories.

Percentage of Students by Performance Category-Course Student Learning Outcomes									
Outcome	1	2	3	4	5	6	7	8	9
A (80 - 100%)	61.90%	61.90%	47.62%	57.14%	61.90%	57.14%	61.90%		
S (40 - 80%)	28.57%	28.57%	38.10%	33.33%	28.57%	28.57%	23.81%		
U (<40%)	9.52%	9.52%	14.29%	9.52%	9.52%	14.29%	14.29%		
N (Not Measured)								X	X
	Student Learning Outcomes from the Course								
	1	2	3	4	5	6	7	8	9
	88.7%	93.8%	94.7%	92.8%	92.2%	93.1%	101.7%	0.0%	0.0%
	80.3%	80.3%	85.8%	79.2%	84.7%	80.9%	90.8%	0.0%	0.0%
	88.7%	88.2%	91.6%	90.0%	93.1%	88.7%	95.0%	0.0%	0.0%
	41.8%	44.7%	0.0%	40.8%	41.3%	30.4%	0.0%	0.0%	0.0%
	86.9%	91.5%	84.2%	87.2%	90.9%	91.3%	82.5%	0.0%	0.0%
	86.4%	82.6%	86.3%	85.2%	88.8%	83.0%	84.2%	0.0%	0.0%
	64.9%	55.3%	79.5%	66.4%	72.2%	60.0%	81.7%	0.0%	0.0%
	32.8%	21.5%	30.5%	12.4%	23.8%	20.3%	15.8%	0.0%	0.0%
	61.3%	51.5%	78.9%	55.6%	60.6%	50.1%	81.7%	0.0%	0.0%
	80.0%	84.7%	82.6%	89.6%	84.4%	85.1%	80.8%	0.0%	0.0%
	12.6%	14.4%	0.0%	19.6%	15.3%	14.6%	0.0%	0.0%	0.0%
	67.9%	74.4%	71.6%	68.0%	71.9%	74.3%	74.2%	0.0%	0.0%
	88.5%	88.5%	76.8%	89.6%	90.3%	81.8%	70.8%	0.0%	0.0%
	80.8%	87.6%	80.5%	86.8%	84.4%	90.7%	89.2%	0.0%	0.0%
	76.9%	71.2%	77.4%	79.6%	77.8%	70.7%	85.8%	0.0%	0.0%
	98.7%	100.6%	99.5%	99.6%	100.6%	100.3%	100.8%	0.0%	0.0%
	93.1%	81.5%	97.4%	91.6%	94.4%	80.6%	99.2%	0.0%	0.0%
	84.4%	92.1%	77.4%	90.4%	90.0%	80.9%	78.3%	0.0%	0.0%
	51.8%	67.9%	54.2%	63.6%	70.3%	72.8%	72.5%	0.0%	0.0%
	82.6%	83.8%	73.2%	82.4%	85.3%	76.4%	68.3%	0.0%	0.0%
	83.1%	89.4%	85.8%	85.2%	88.1%	89.3%	81.7%	0.0%	0.0%
Average	83.41%	85.19%	86.28%	83.77%	86.26%	85.05%	88.45%	0.00%	0.00%

This part of the tool distributes all the students under each CSLO into one of the three categories (A: Above Satisfactory, S: Satisfactory, U: Unsatisfactory) as per the criteria in the course rubric, or registers ‘N’ for the CSLO Not Measured.

Course Student Learning Outcomes (CSLOs) Assessment Tool:

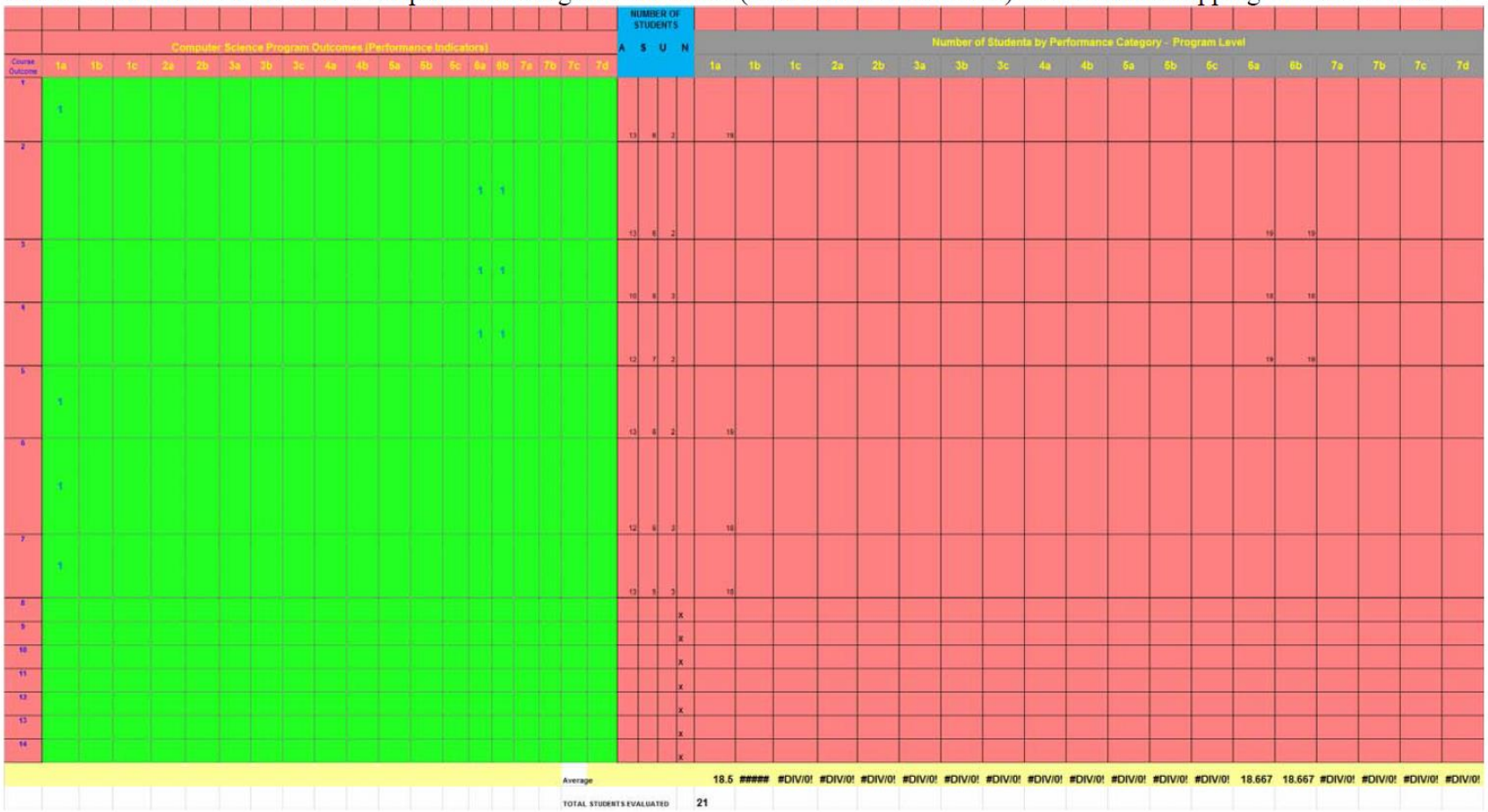
Part D: Implementation of Mapping of the Course Student Learning Outcomes to Program Outcomes (POs) (Performance Indicators)

Student Learning Outcomes from the Course																																Computer Science Program Outcomes (Performance Indicators)																		
Outcome	Description																											Total (1)-(5) pts			Course Outcome	1a	1b	1c	2a	2b	3a	3b	3c	4a	4b	5a	5b	5c	6a	6b	7a	7b	7c	7d
1	Understand the basic concepts of computer system, information processing cycle, major hardware components.		1	1		1	1					1	1	1												1		390	390		1	1																		
2	Understand the responsibilities of computing professions, social implication of computing, the ACM codes of conduct and acceptable use policies of workplace (the university).		1				1			1		1		1												1		340	340		2														1	1				
3	Understand the ethical and legal basis for privacy protection and security issues on Internet and computer system.			1							1		1													1		190	190		3														1	1				
4	Understand the basic concepts of intellectual property, the current copyright laws, and the software piracy.											1		1												1		250	250		4														1	1				
5	Understand the major concepts and technologies associated with Internet, Web, wired and wireless communication and computer networks.		1	1				1				1		1												1		320	320		5	1																		
6	Learn the functions of computer system software and their importance to computer systems and users, and be able to use the personal productivity software to solve given problems.				1				1	1		1		1												1		335	335		6	1																		
7	Learn the basic concepts and techniques in programming languages, algorithms, and program development life cycle										1															1		120	120		7	1																		

- This part of the CSLO tool implements the mapping of the each of the CSLOs to POs as per the approved mapping (Table 5).

Course Student Learning Outcomes (CSLOs) Assessment Tool:

Part E: Calculation of the course's input to the Program Outcomes (Performance Indicators) based on the mapping of CSLOs to POs



- This part of the CSLO tool calculates the number of students that showed acceptable performance in the course as per the Course Rubric criteria.
- It calculates the number of students under each Performance Indicator as per the CSLO and PO mapping.
- It calculates the Average Number of Students under each Performance Indicator.
- It also registers the total number of students in the course being evaluated.

Appendix C-4 – Course Assessment Tool: Post-Semester Course Assessment by Instructor

Alabama A&M University
Computer Science
Instructor's Course Report and Assessment
FINAL

1. Course Information:

Course Title:	Intro. Computers and Ethics
Course # & Section:	CMP104 Section 0
Instructor:	X. Zhao
Semester/Year	Spring 2012
Student Learning Course Outcomes:	

Rubric of Students' Performance in the Course

Category by Percent of Class
A : Above Satisfactory (Exceptional)
S : Satisfactory (Accepatable)
U : Unsatisfactory (Unacceptable)
N : Outcome not assessed

2. Assessment of Course Outcomes from Student Performance:

	Course Outcome	A	S	U	N
1	Understand the basic concepts of computer system, information processing cycle, major	61.9%	28.6%	9.5%	
2	Understand the responsibilities of computing professions, social implication of computing, the	61.9%	28.6%	9.5%	
3	Understand the ethical and legal basis for privacy protection and security issues on Internet and	47.6%	38.1%	14.3%	
4	Understand the basic concepts of intellectual property, the current copyright laws, and the	57.1%	33.3%	9.5%	
5	Understand the major concepts and technologies associated with Internet, Web, wired and	61.9%	28.6%	9.5%	
6	Learn the functions of computer system software and their importance to computer systems and	57.1%	28.6%	14.3%	
7	Learn the basic concepts and techniques in programming languages, algorithms, and	61.9%	23.8%	14.3%	
8	0				X
9	0				X
10	0				X
11	0				X
12	0				X
13	0				X
14	0				X

3. Observed Shortcomings:

i	Some students did not catch the concepts and laws related to privacy and intellectual property
ii	
iii	
iv	

4. Corrective Actions Planned:

i	Give more exercise or homework on those topics
ii	customize the textbook and add one chapter on those topics
iii	
iv	

Fill these area with the data/info relevant to your course

Using this tool the instructor identifies the shortcomings (section 3 of the tool) based on the performance categories (section 2) and the experiences during the semester, and also lists the corrective actions suggested or planned for the next time the course is offered.

Appendix D – Student and Course Outcomes Assessment

The CS Program is engaged in a continuous assessment process for determining the extent of attainment of Student Outcomes and program Educational Objectives. Student Outcomes are measured and documented using various direct and indirect measurement tools. Direct measurement instruments used for determination of the degree of attainment of student outcomes include course rubrics and course outcomes spreadsheets that are utilized by the instructors for all the CS classes taught each semester. The outcomes spreadsheet for each class provides detailed information about the degree of attainment of each one of the outcomes that are addressed by that course. The attainment of each outcome associated with the course is recorded and tracked dynamically throughout the semester, for each student and the entire class. Student outcomes are aggregated across all courses in order to obtain a direct and quantitative measure of the degree of attainment of each student outcome. Indirect measurement instruments used for measuring the degree of attainment of student outcomes include various survey tools including Student Course Evaluation Form, graduating Senior Survey Form and Alumni Survey Form.

Each plot below in Figure 9 through Figure 53 shows the score distributions of all the Student Outcomes addressed by the respective course over 2015-2016 offerings. Horizontal and vertical axes represent, respectively, Student Outcomes and number of students as a percentage of the sample population. Maximum score is one-hundred and the score range is partitioned into five segments. The bar heights represent the percentage of students that attained the respective score (color) on the particular Outcome. The course number, data collection time period and the number of students for each data set are listed at the top of each plot.

CS 102 Section 0, Fall 2015 (24 Students)

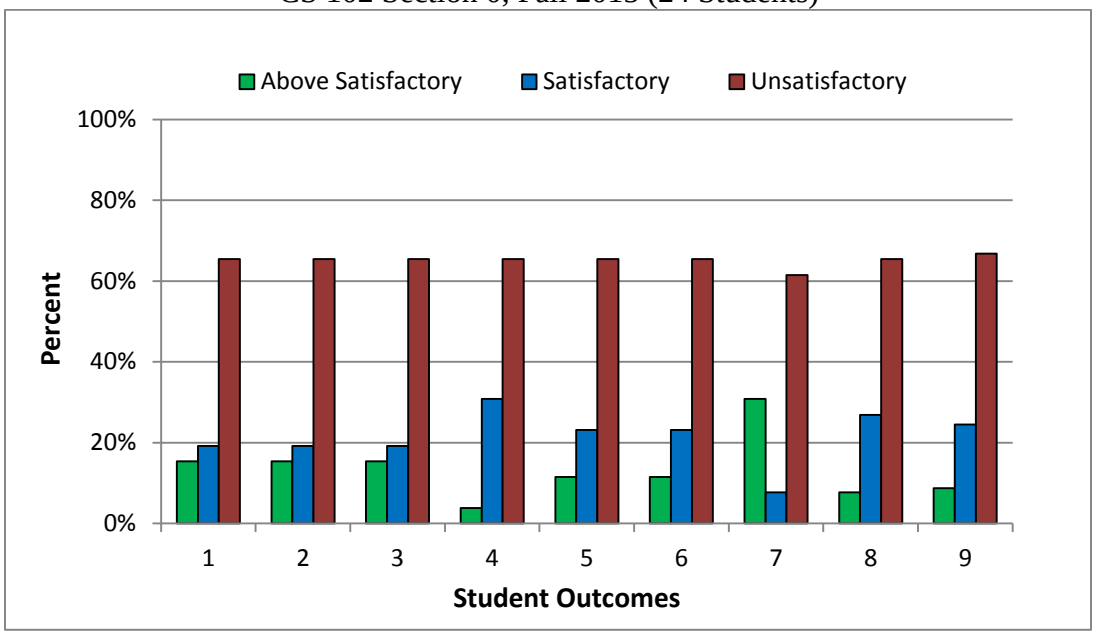


Figure 9 Course Outcomes, CS 102-0

CS 102 Section 1, Fall 2015 (24 Students)

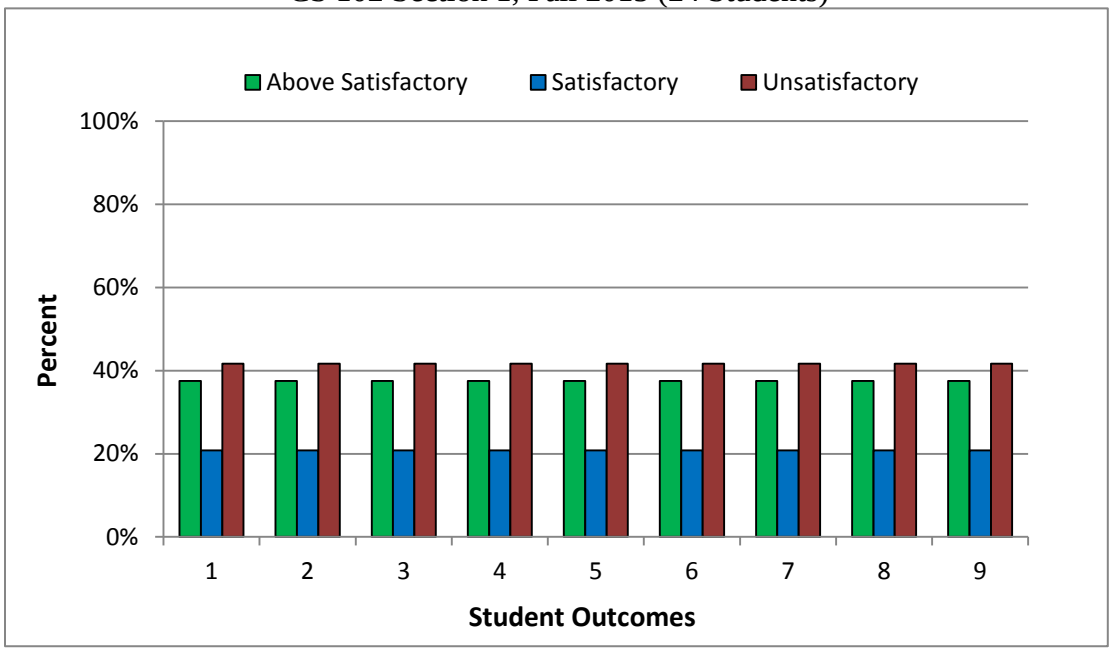


Figure 10. Course Outcomes, CS 102-1

CS 102 Section 2, Fall 2015 (15 Students)

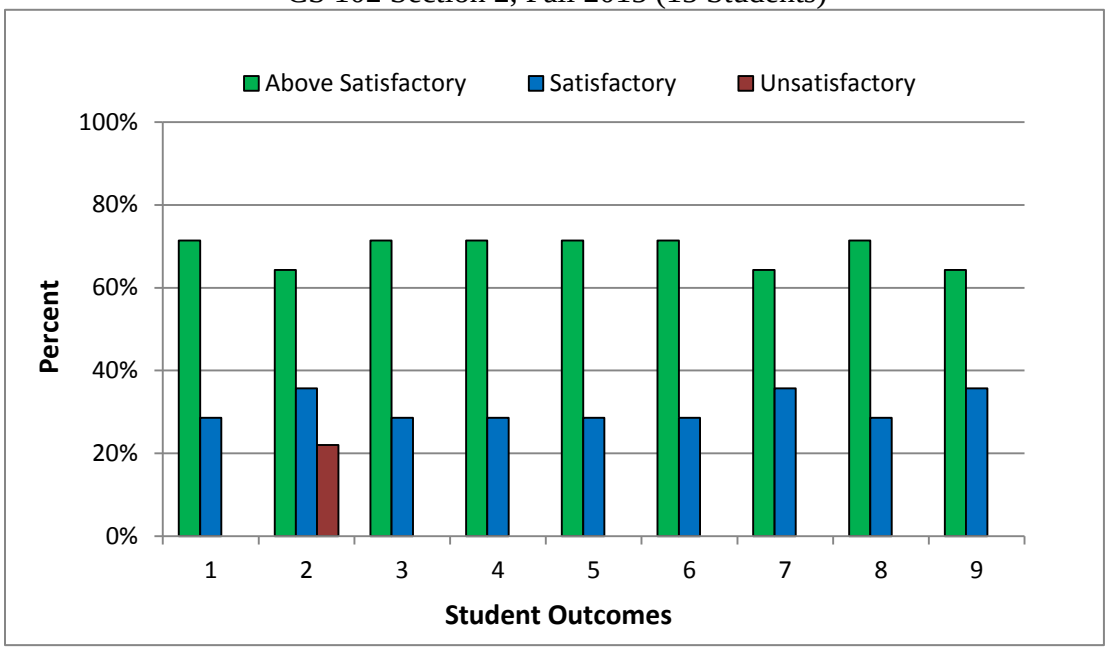


Figure 11. Course Outcomes, CS 102-2

CS 104 Section 0, Fall 2015 (30 Students)

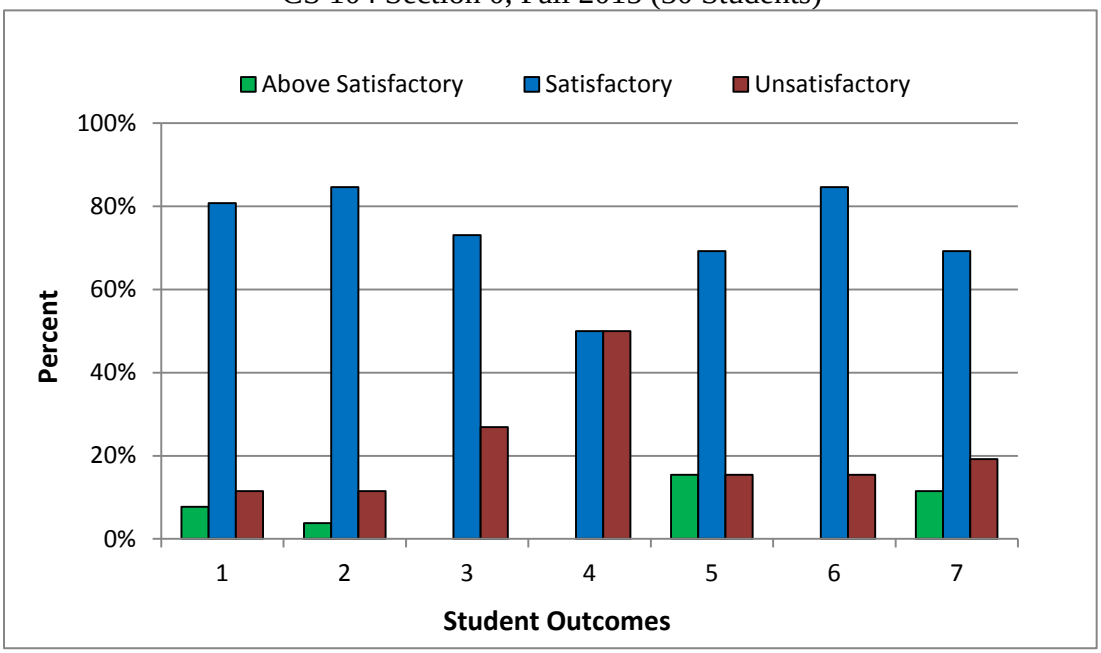


Figure 12. Course Outcomes, CS 104-0

CS 104 Section 1, Fall 2015 (30 Students)

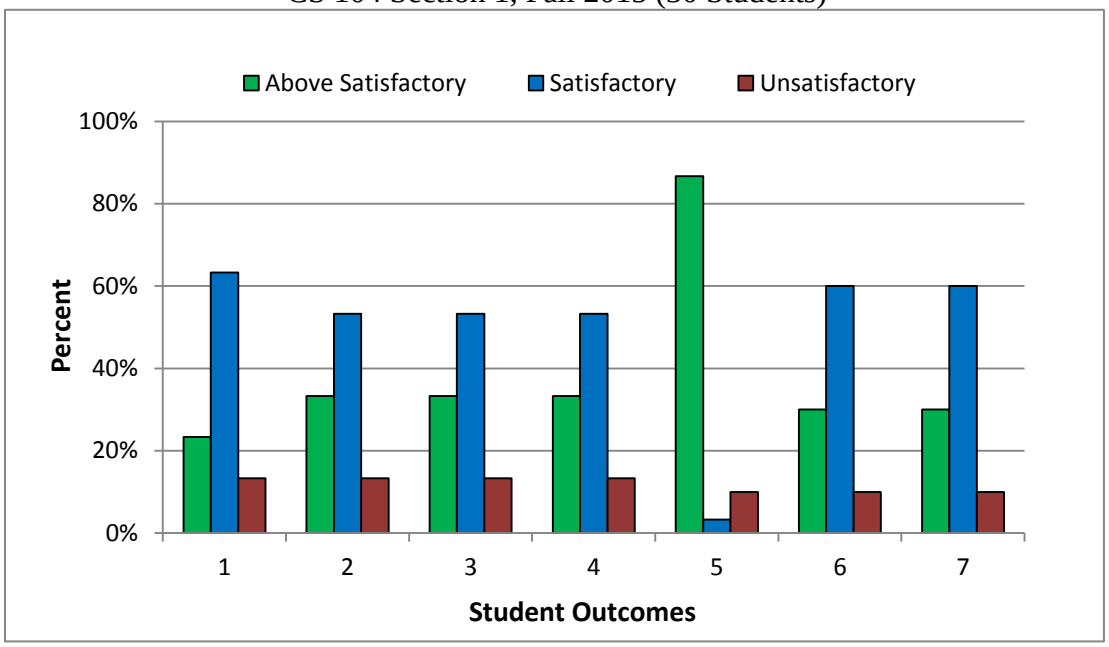


Figure 13. Course Outcomes, CS 104-1

CS 104 Section 2, Fall 2015 (31 Students)

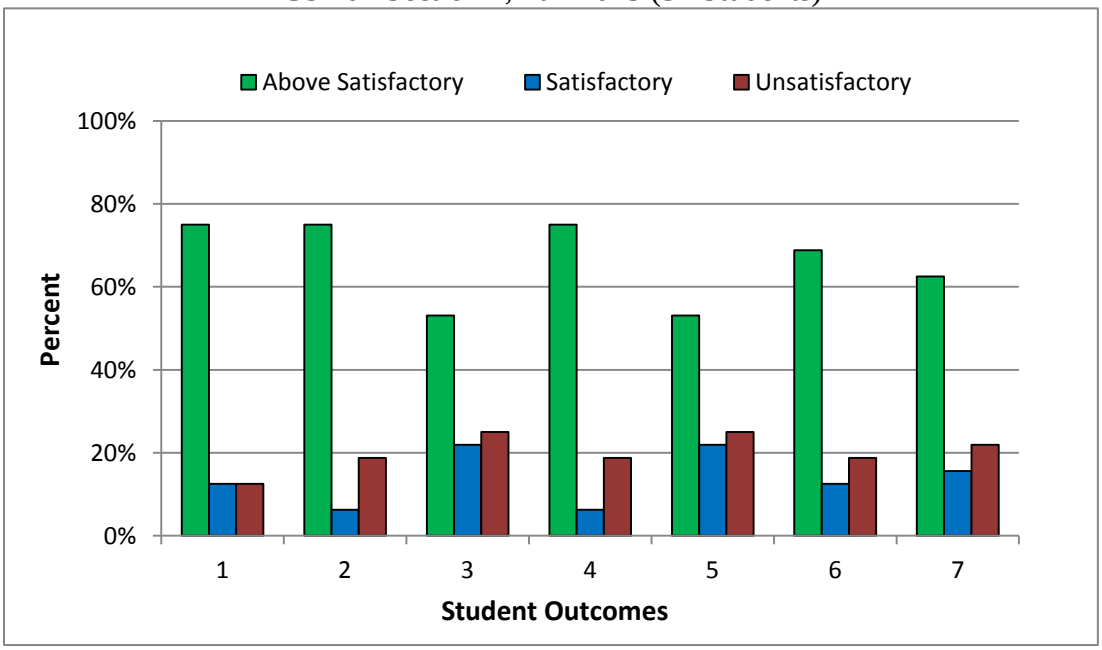


Figure 14. Course Outcomes, CS 104-2

CS 109 Section 2, Fall 2015 (27 Students)

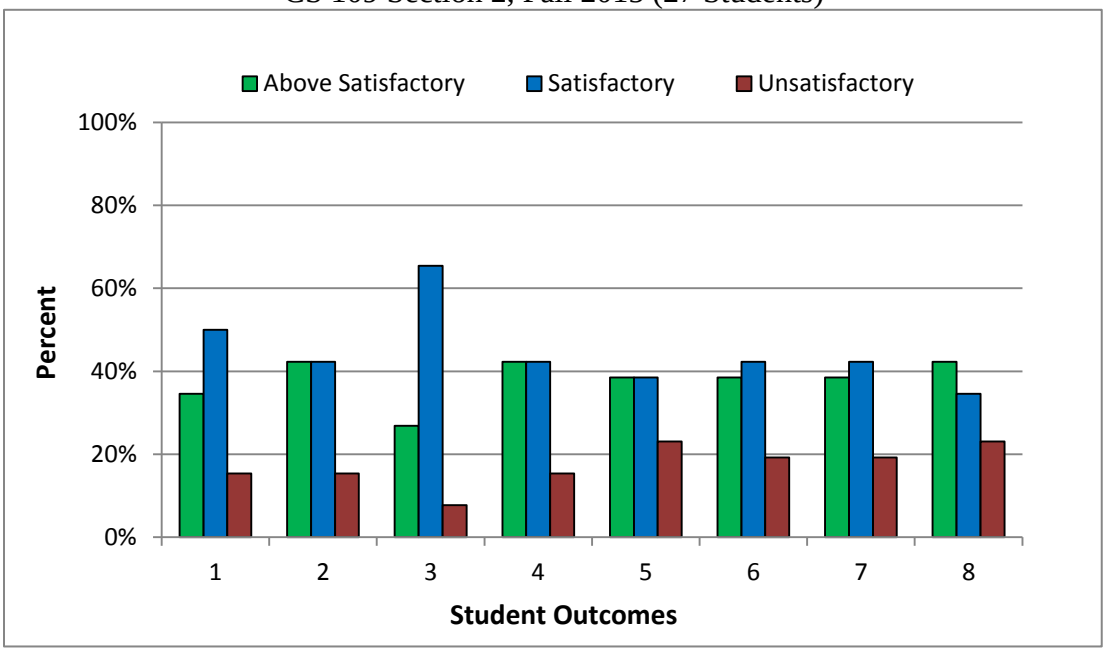


Figure 15. Course Outcomes, CS 109-2

CS 109 Section 3, Fall 2015 (19 Students)

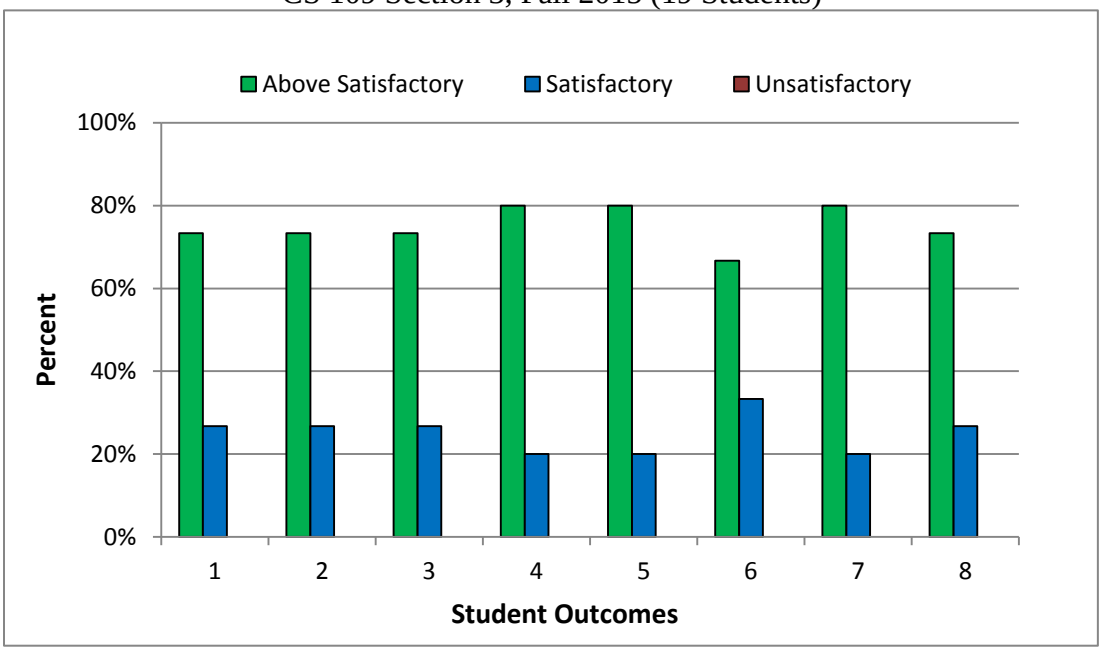


Figure 16. Course Outcomes, CS 109-3

CS 203 Section 0, Fall 2015 (28 Students)

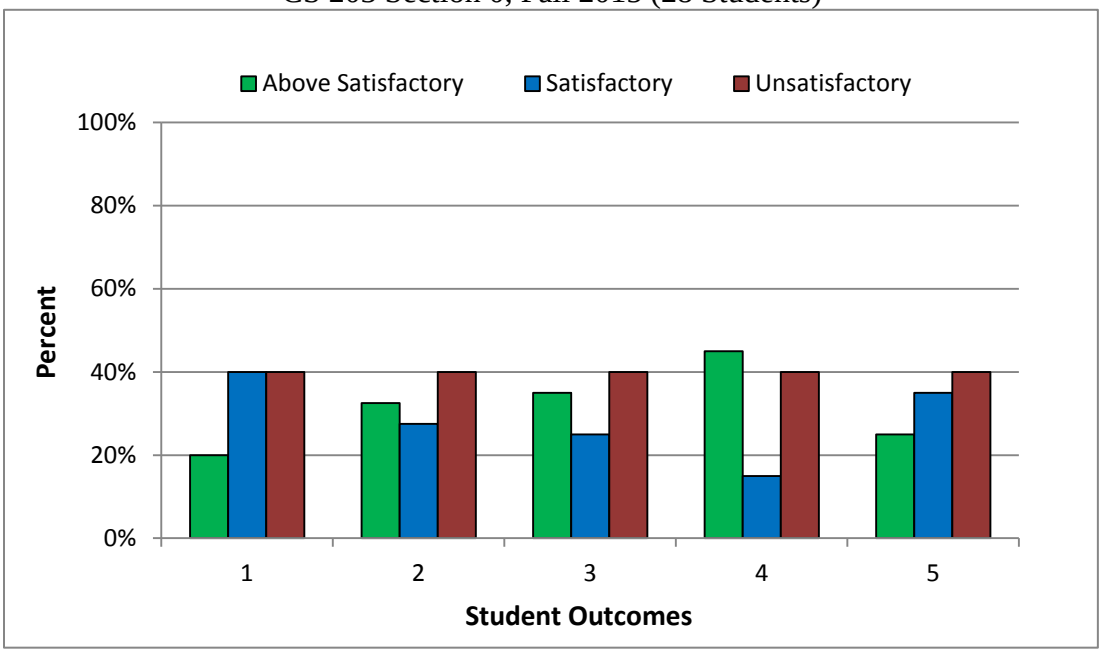


Figure 17. Course Outcomes, CS 203-0

CS 206 Section 0, Fall 2015 (25 Students)

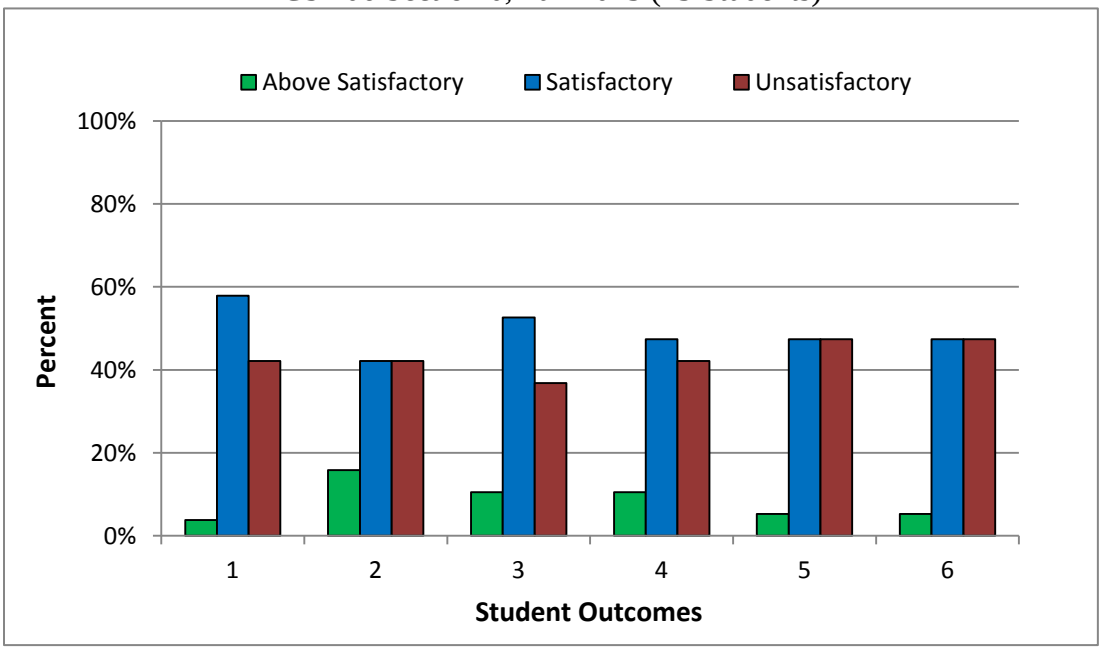


Figure 18. Course Outcomes, CS 206-0

CS 209 Section 0, Fall 2015 (14 Students)

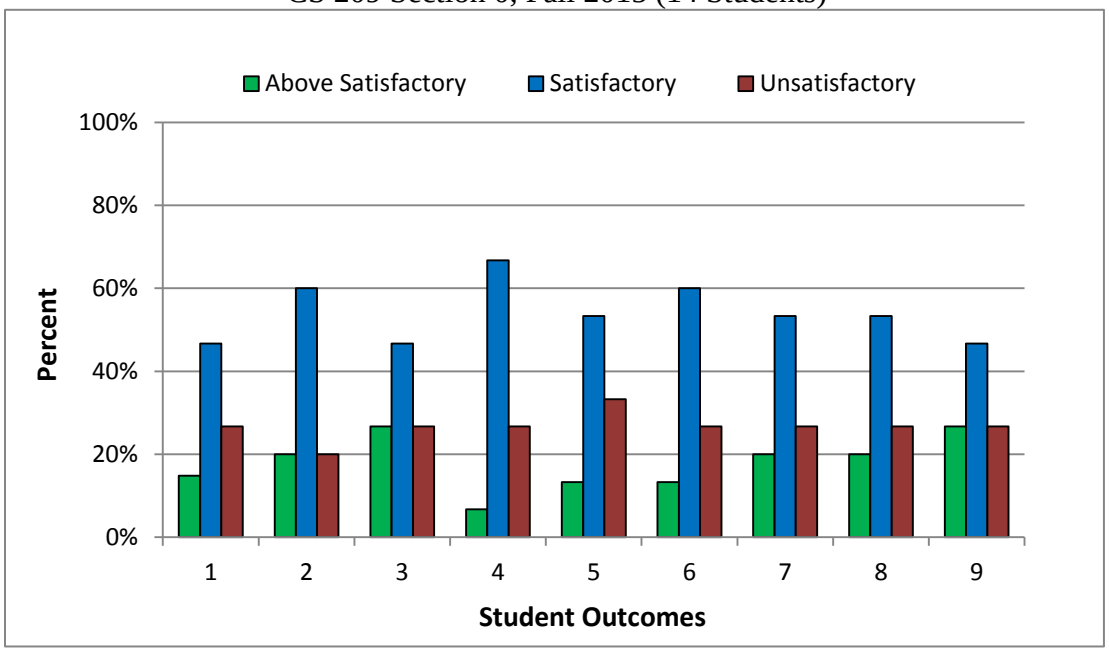


Figure 19. Course Outcomes, CS 209-0

CS 215 Section 0, Fall 2015 (24 Students)

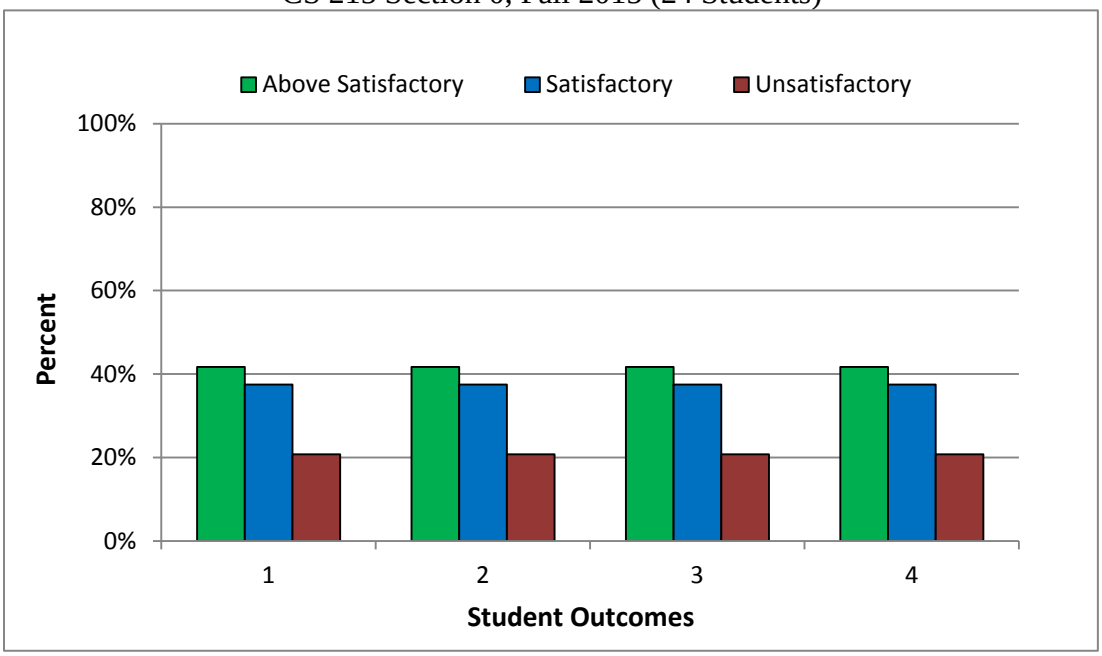


Figure 20. Course Outcomes, CS 215-0

CS 304 Section 0, Fall 2015 (11 Students)

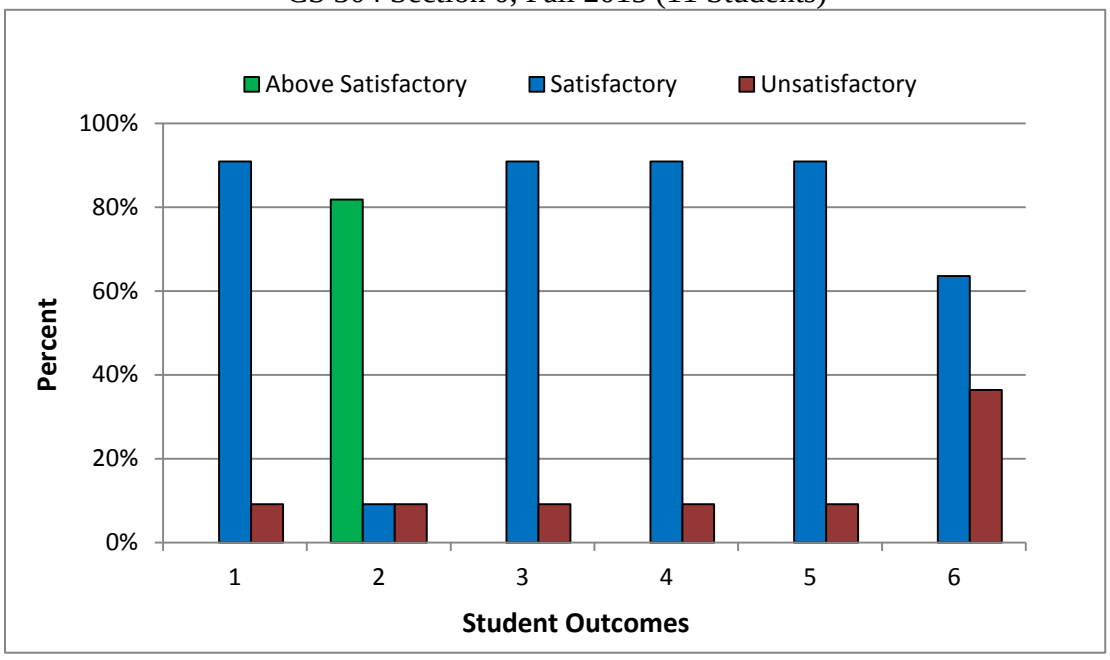


Figure 21. Course Outcomes, CS 304-0

CS 309 Section 0, Fall 2015 (3 Students)

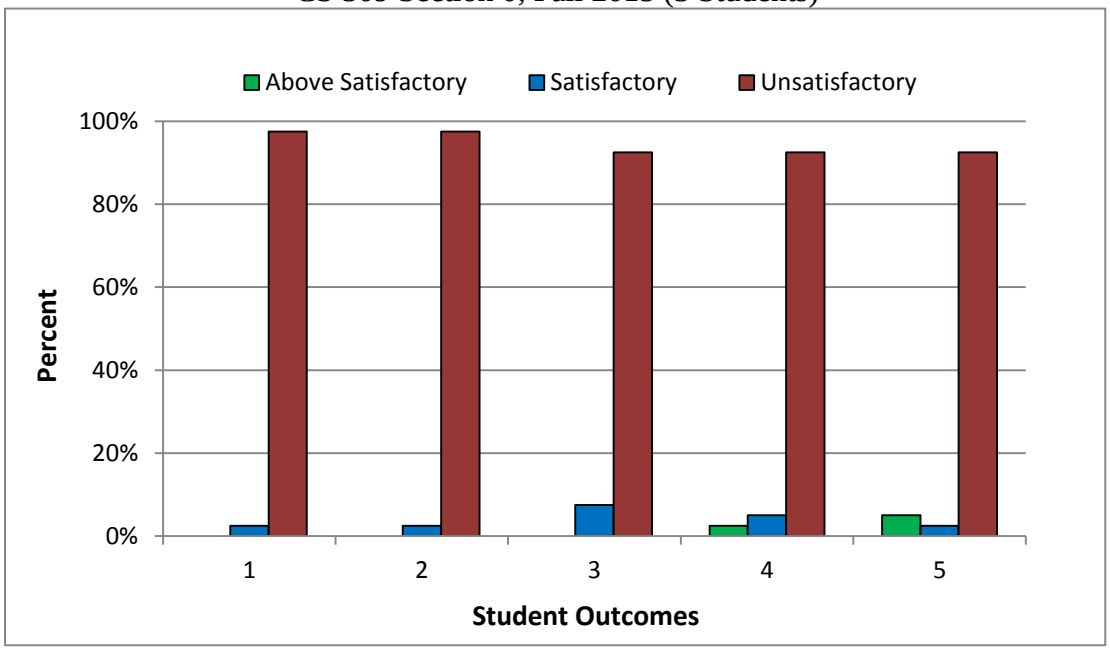


Figure 22. Course Outcomes, CS 309-0

CS 314 Section 0, Fall 2015 (21 Students)

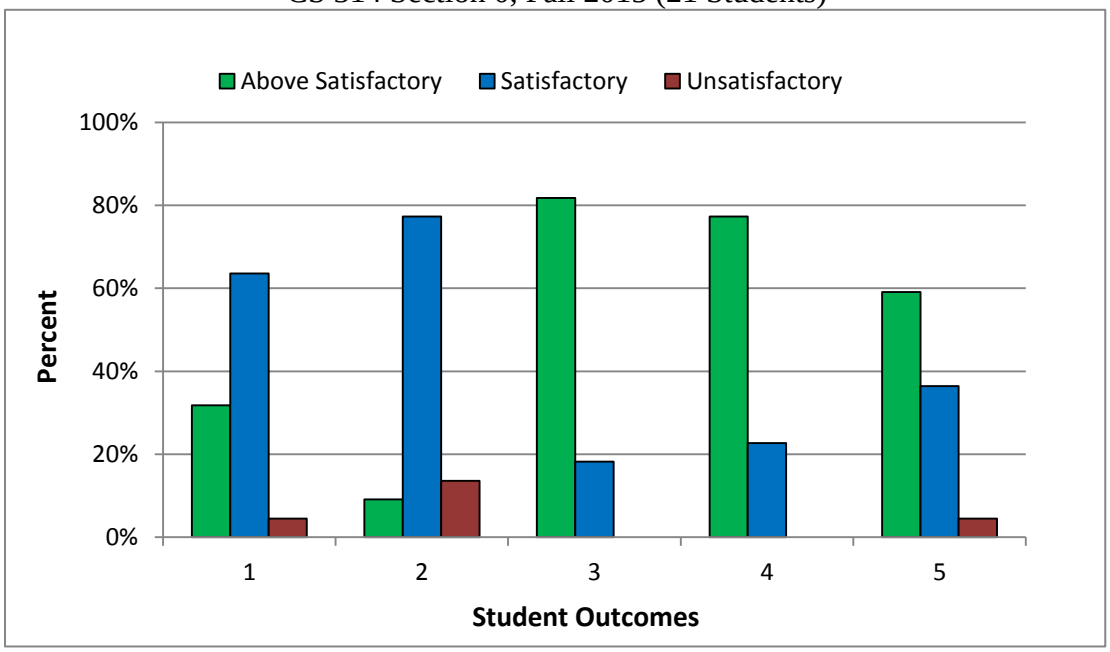


Figure 23. Course Outcomes, CS 314-0

CS 321 Section 0, Fall 2015 (14 Students)

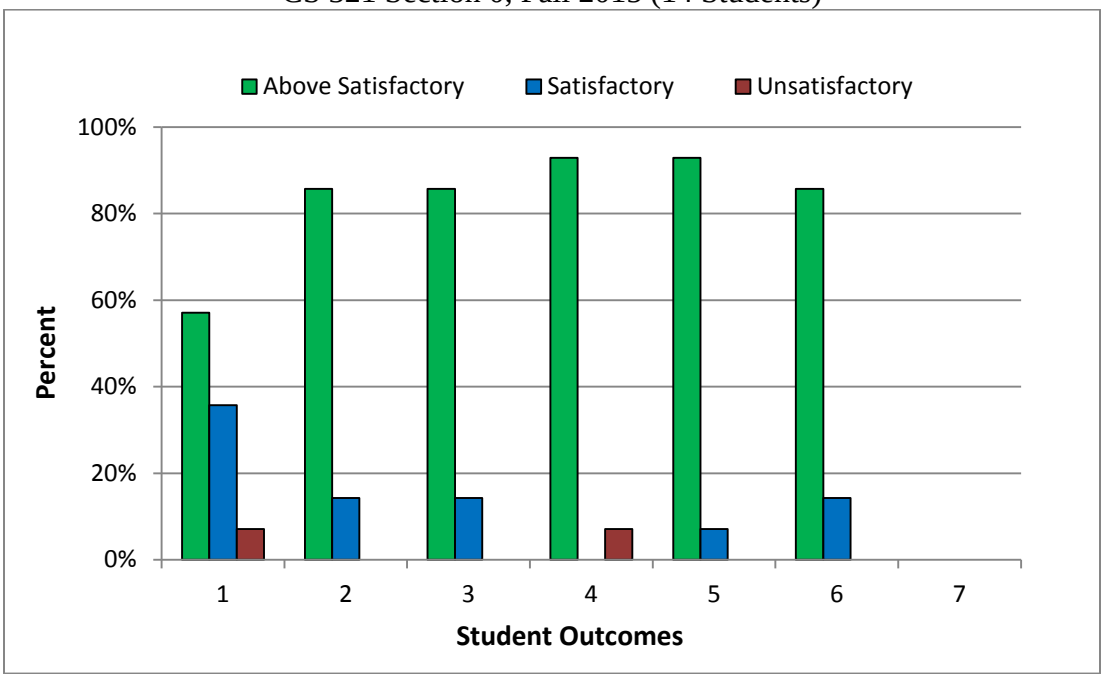


Figure 24. Course Outcomes, CS 321-0

CS 381 Section 0, Fall 2015 (14 Students)

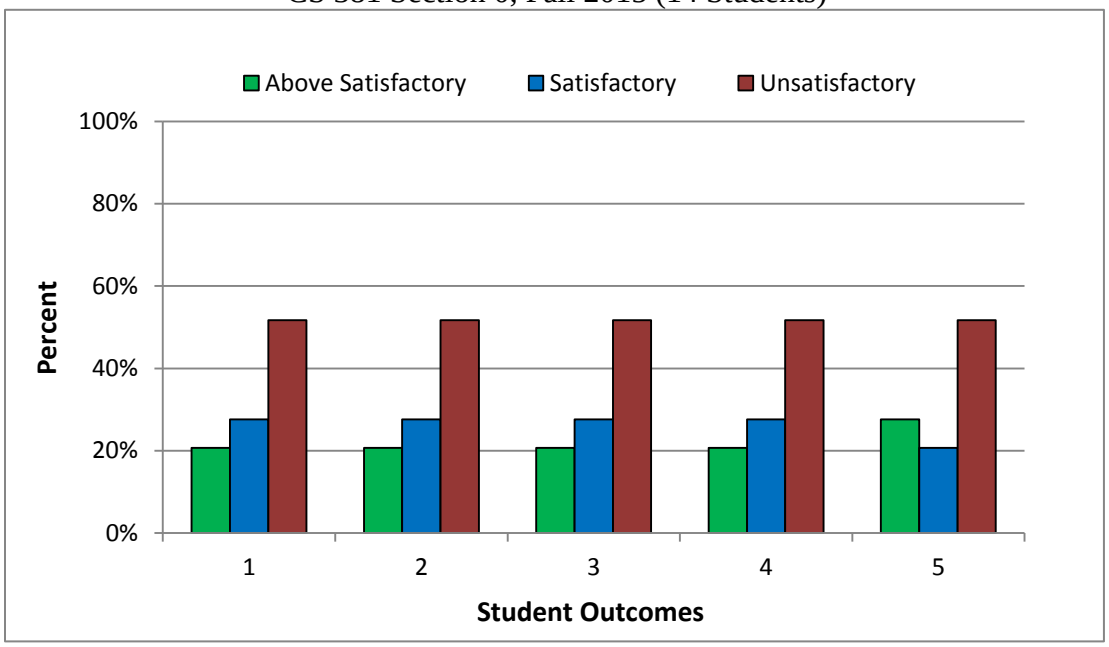


Figure 25. Course Outcomes, CS 381-0

CS 384 Section 0, Fall 2015 (1 Student)

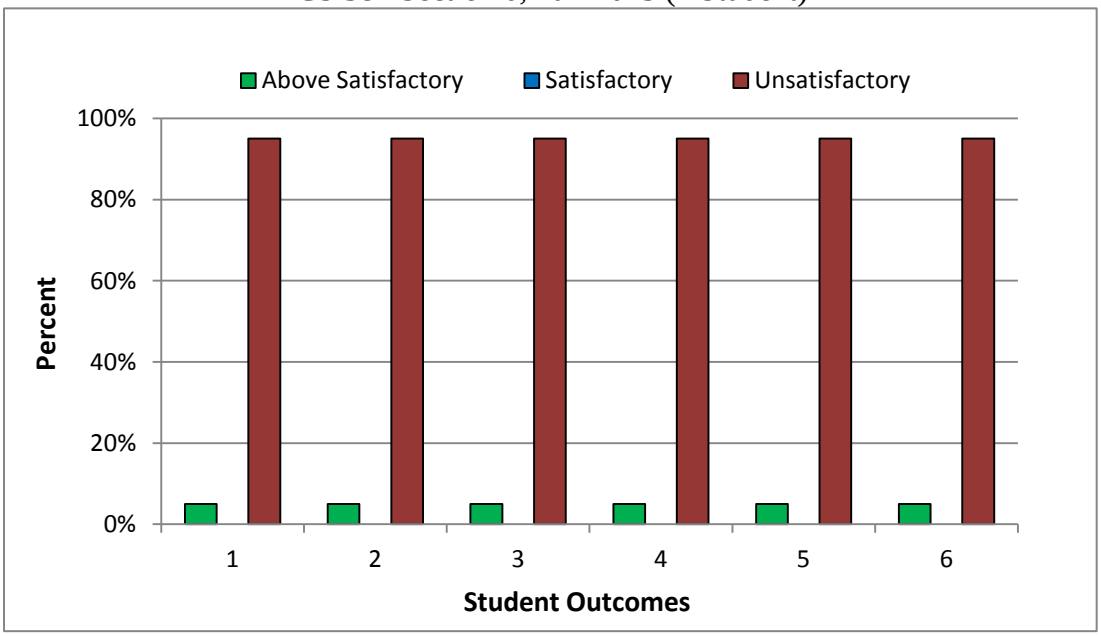


Figure 26. Course Outcomes, CS 384-0

CS 401 Section 0, Fall 2015 (19 Students)

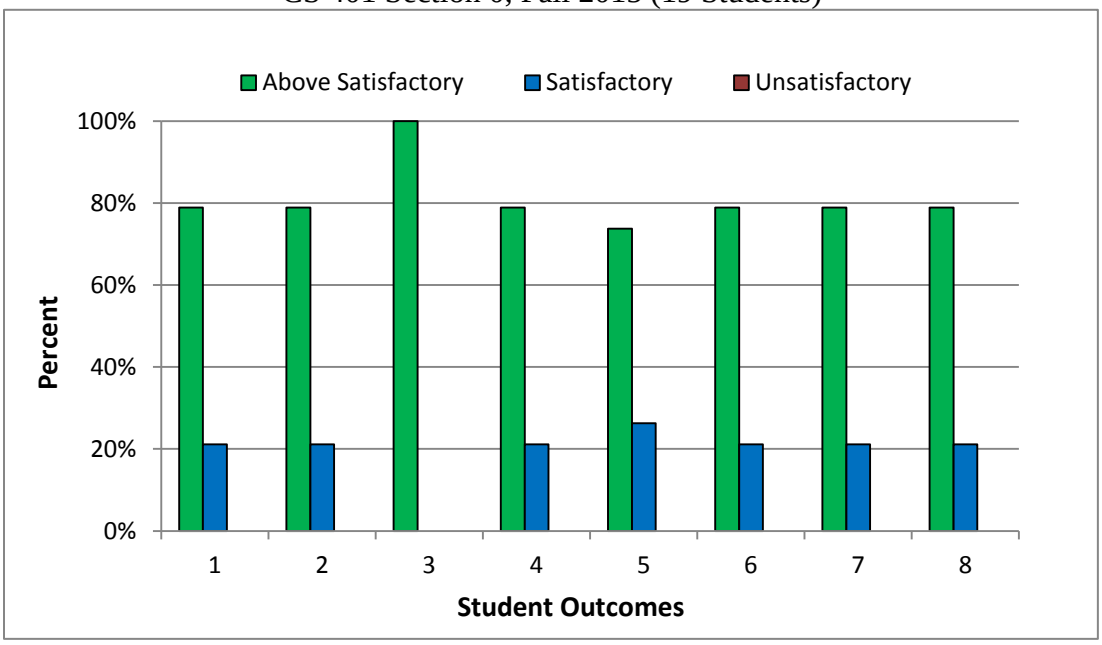


Figure 27. Course Outcomes, CS 401-0

CS 408 Section 0, Fall 2015 (9 Students)

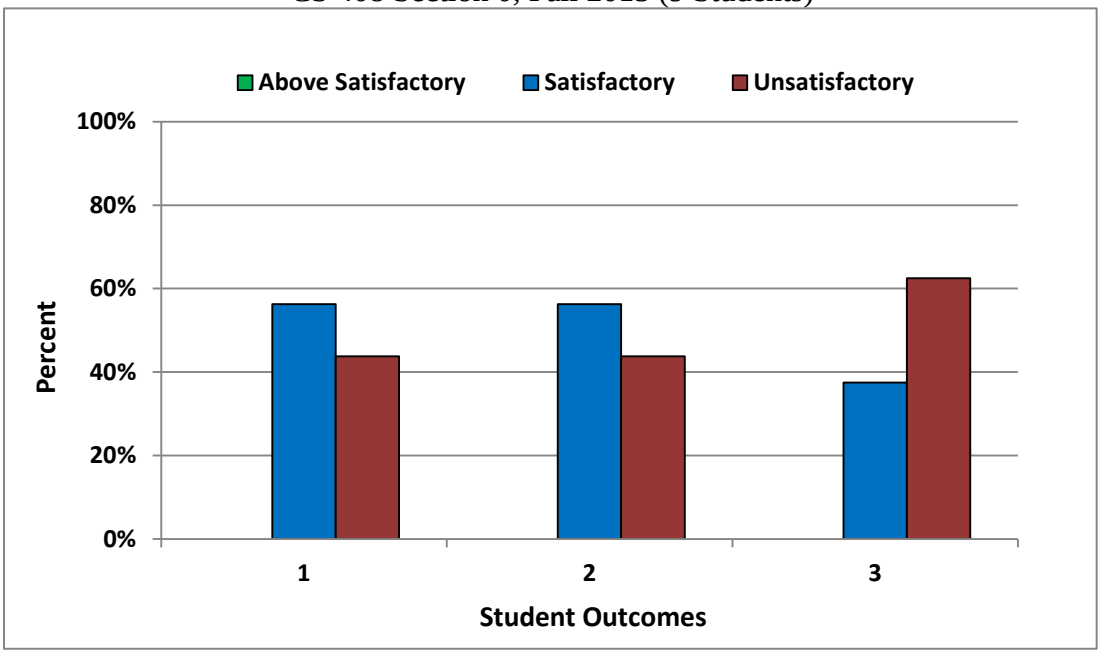


Figure 28. Course Outcomes, CS 408-0

CS 421 Section 0, Fall 2015 (18 Students)

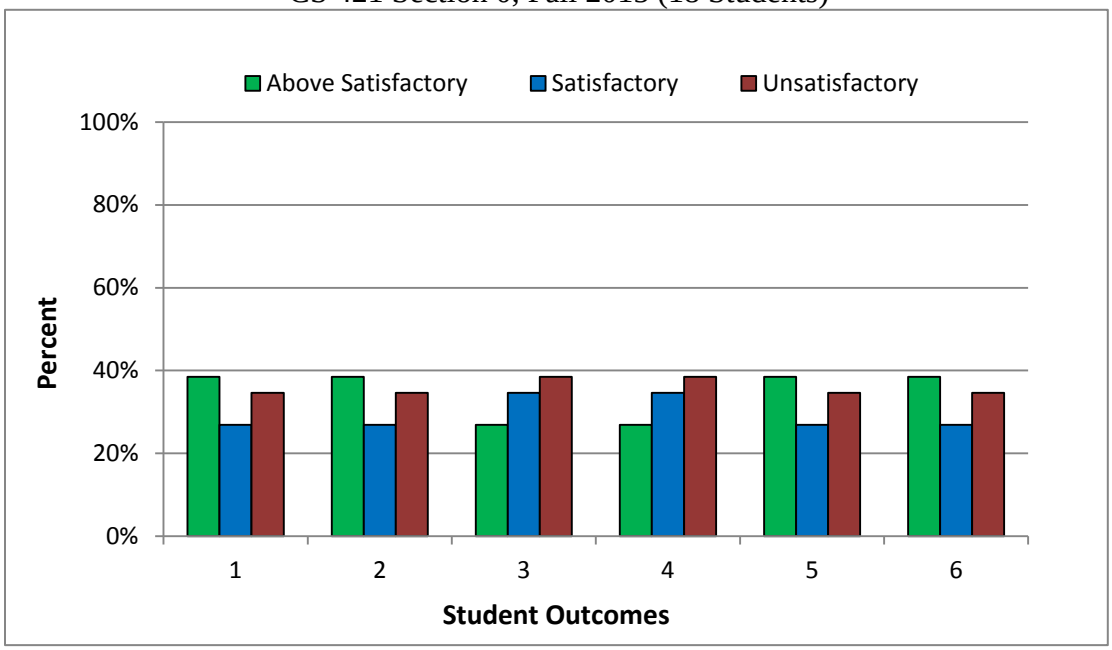


Figure 29. Course Outcomes, CS 421-0

CS 425 Section 0, Fall 2015 (26 Students)

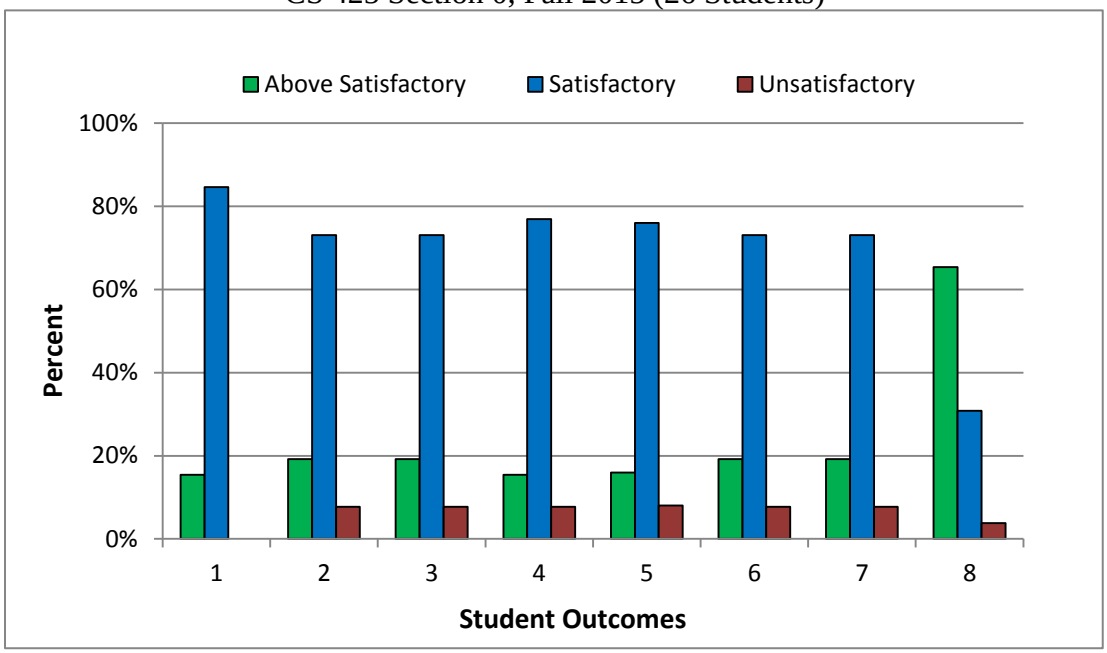


Figure 30. Course Outcomes, CS 425-0

CS 484 Section 0, Fall 2015 (2 Students)

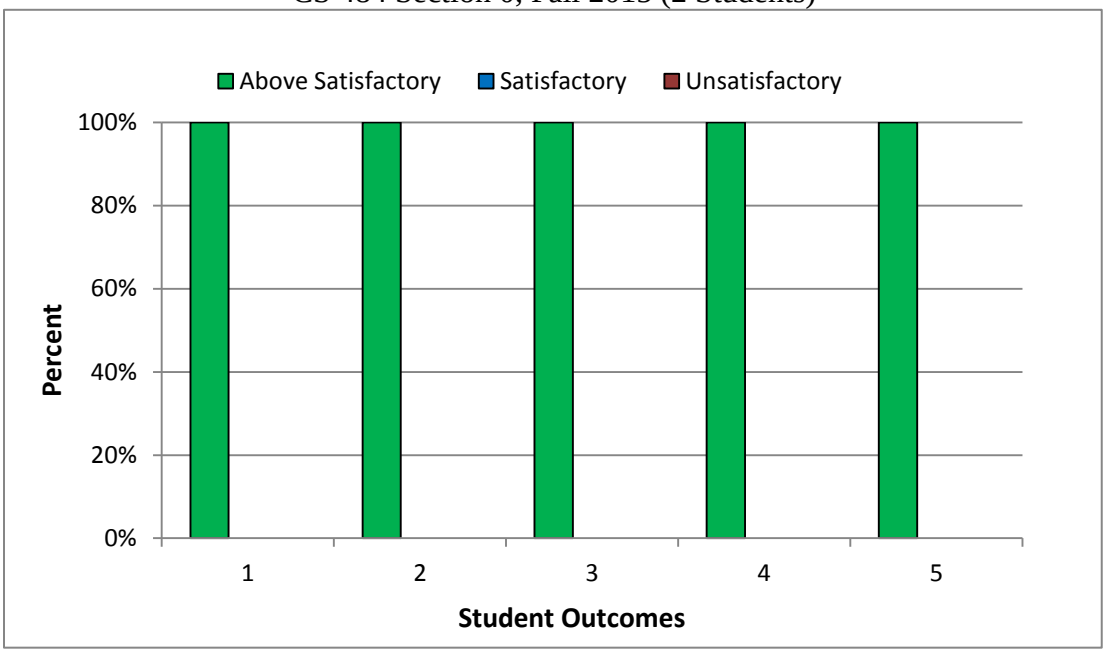


Figure 31. Course Outcomes, CS 484-0

CS 488 Section 0, Fall 2015 (23 Students)

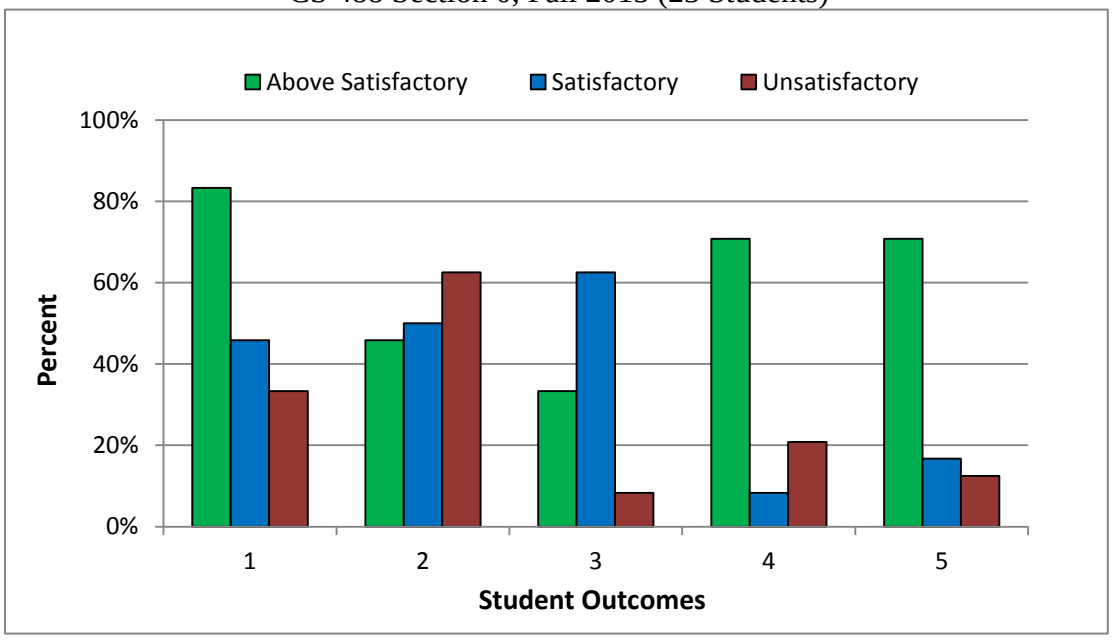


Figure 32. Course Outcomes, CS 488-0

CS 102 Section 0, Spring 2016 (23 Students)

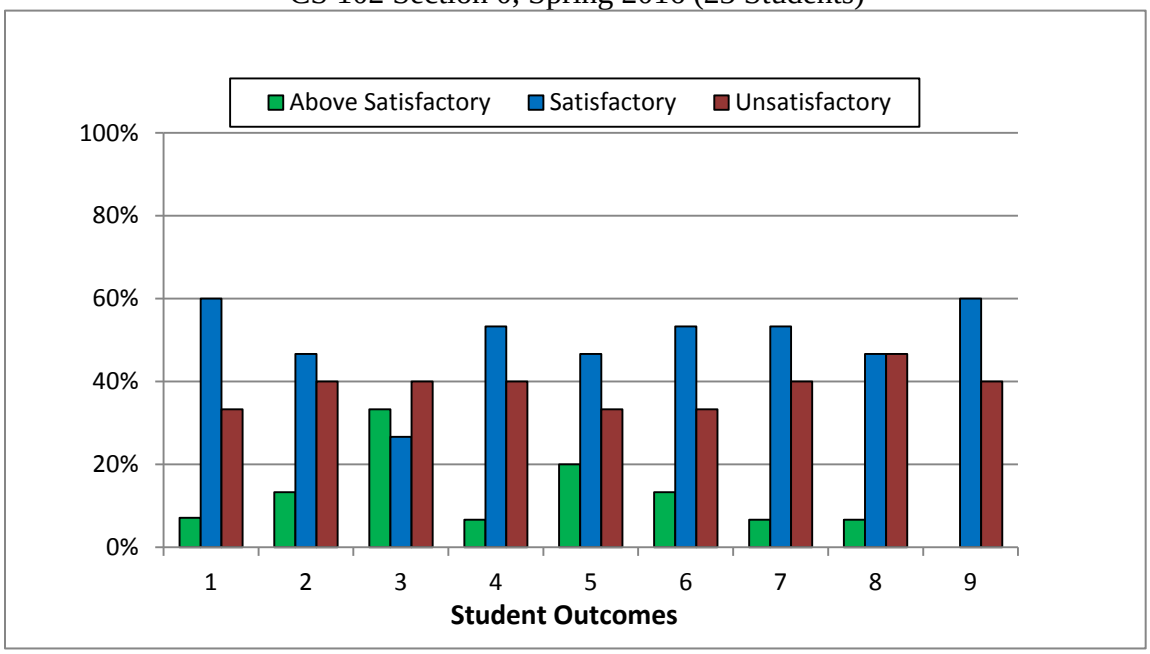


Figure 33. Course Outcomes, CS 102-0

CS 102 Section 1, Spring 2016 (30 Students)

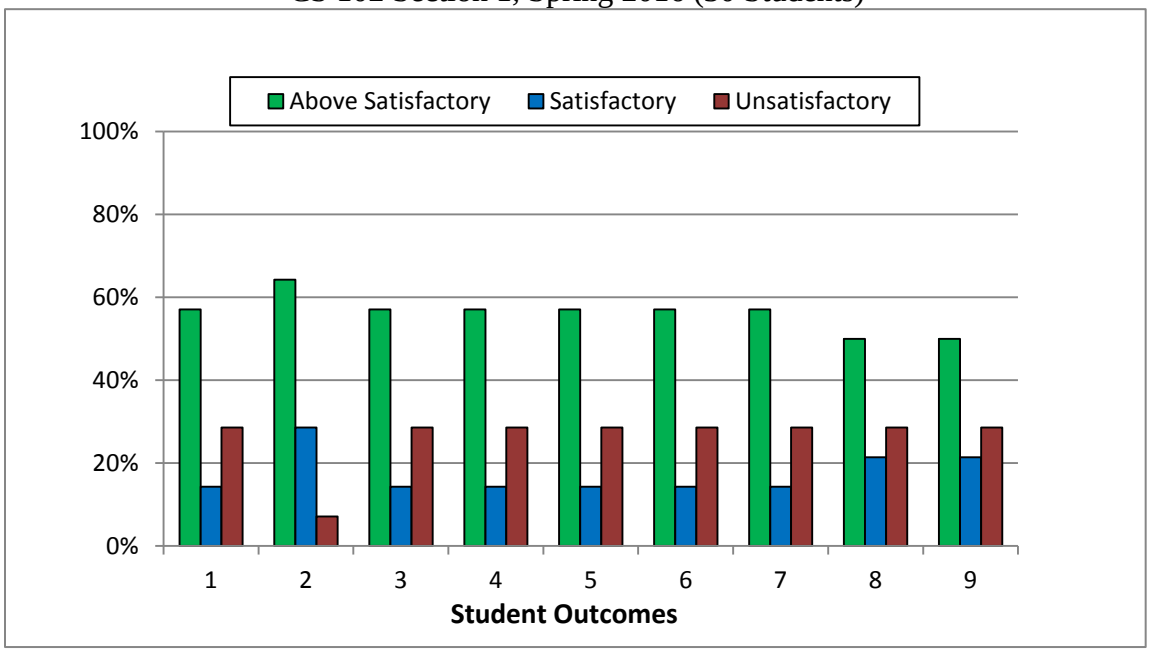


Figure 34. Course Outcomes, CS 102-1

CS 102 Section 2, Spring 2016 (24 Students)

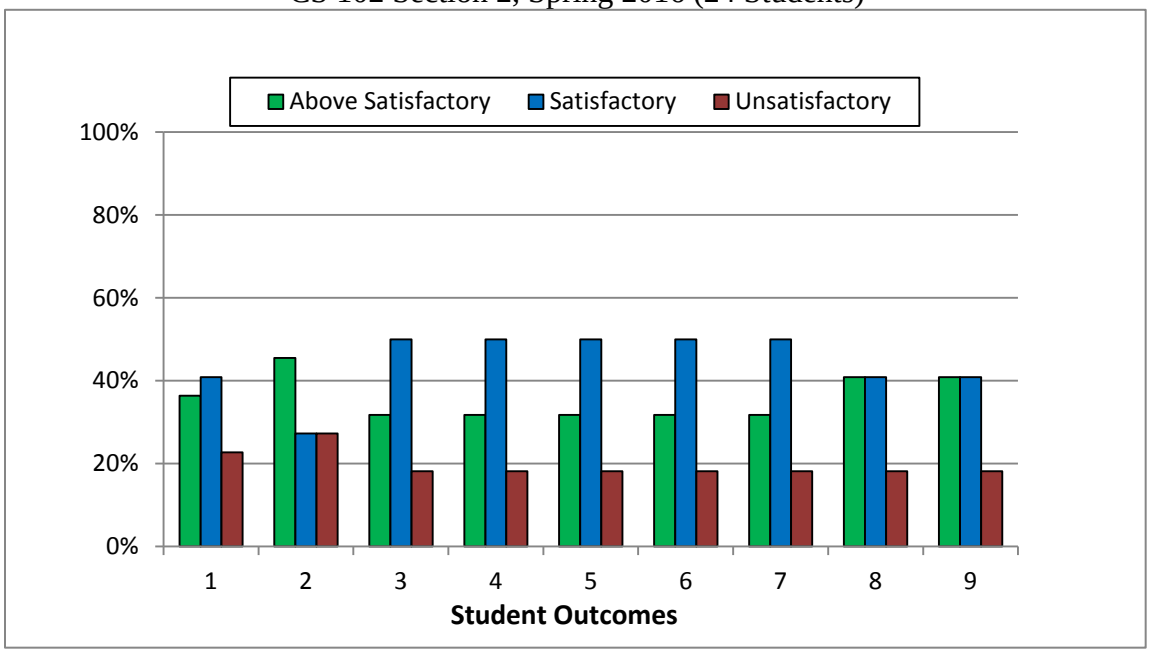


Figure 35. Course Outcomes, CS 102-2

CS 104 Section 0, Spring 2016 (21 Students)

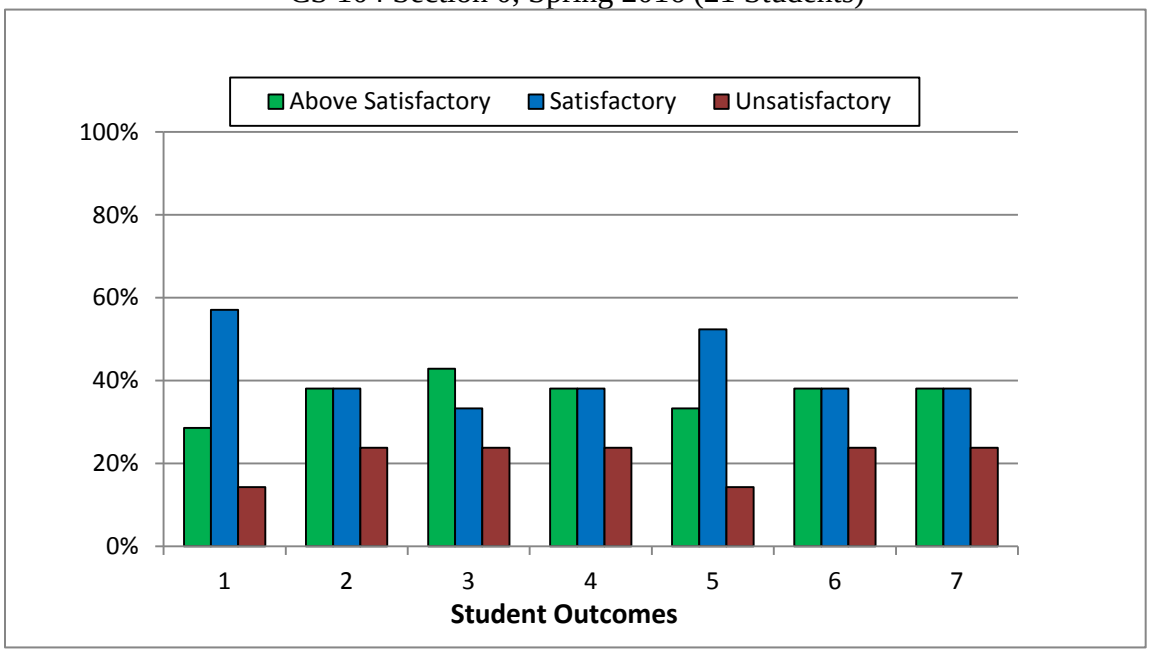


Figure 36. Course Outcomes, CS 104-0

CS 104 Section 1, Spring 2016 (16 Students)

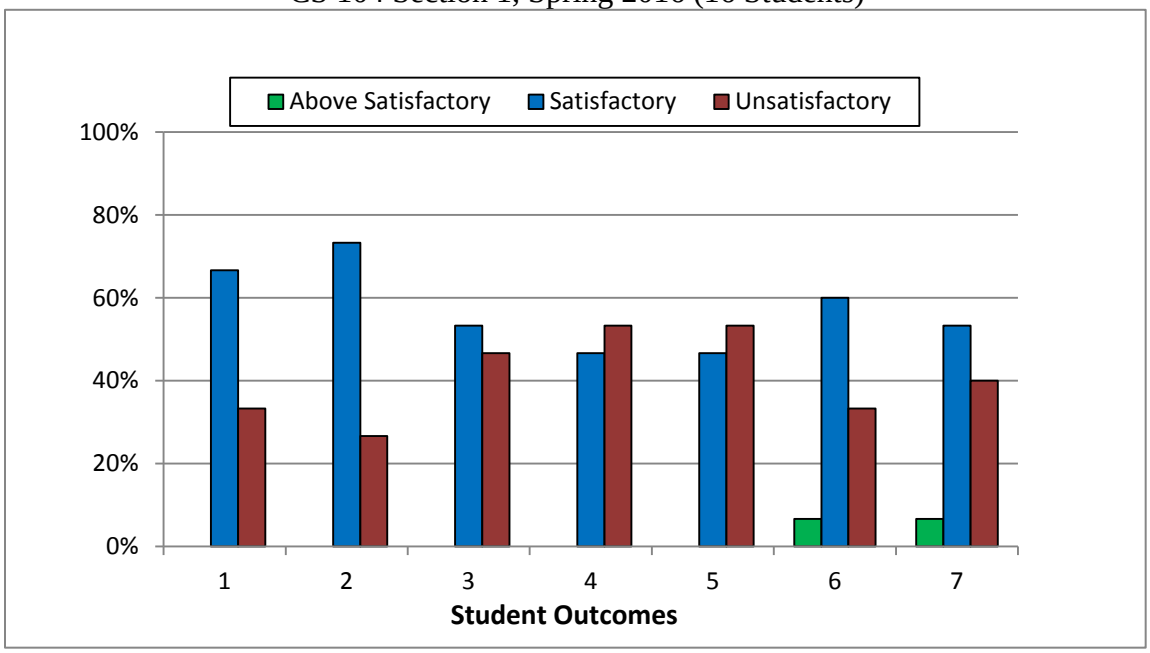


Figure 37. Course Outcomes, CS 104-1

CS 109 Section 0, Spring 2016 (30 Students)

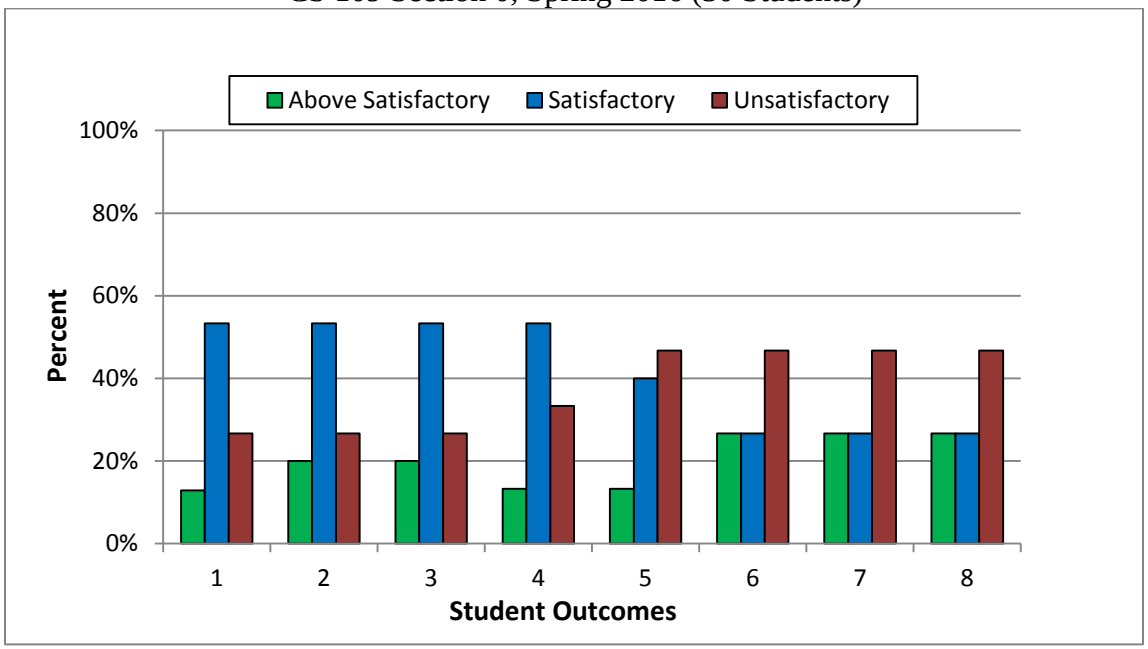


Figure 38. Course Outcomes, CS 109-0

CS 109 Section 1, Spring 2016 (12 Students)

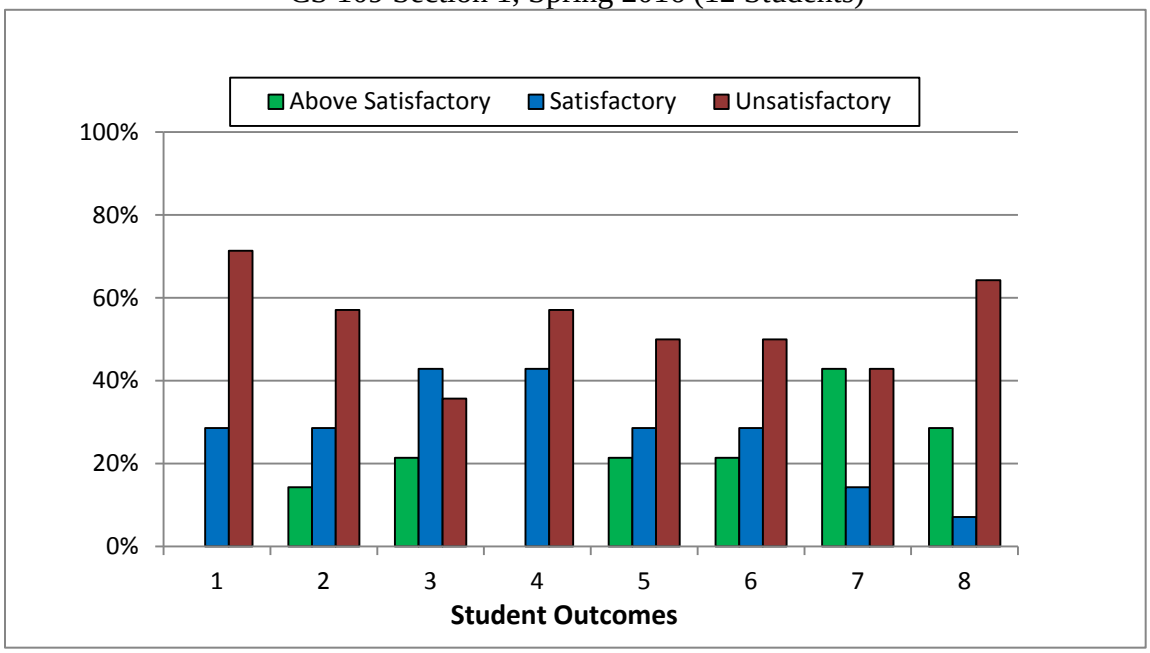


Figure 39. Course Outcomes, CS 109-1

CS 203 Section 0, Spring 2016 (35 Students)

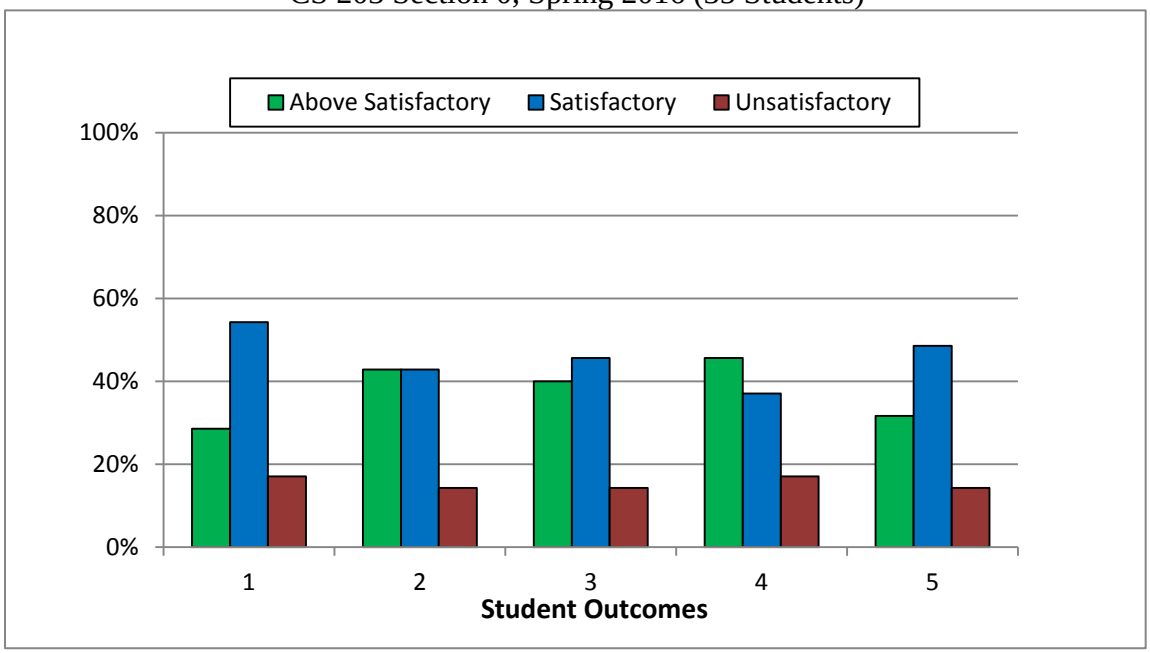


Figure 40. Course Outcomes, CS 203-0

CS 206 Section 0, Spring 2016 (41 Students)

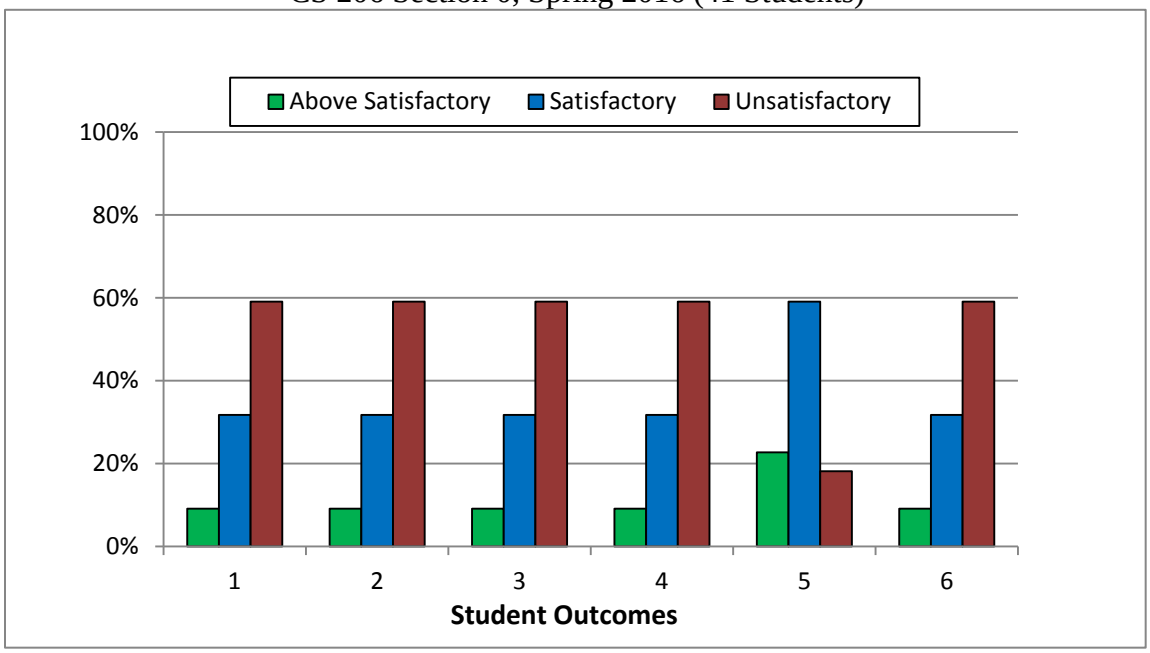


Figure 41. Course Outcomes, CS 206-0

CS 209 Section 0, Spring 2016 (21 Students)

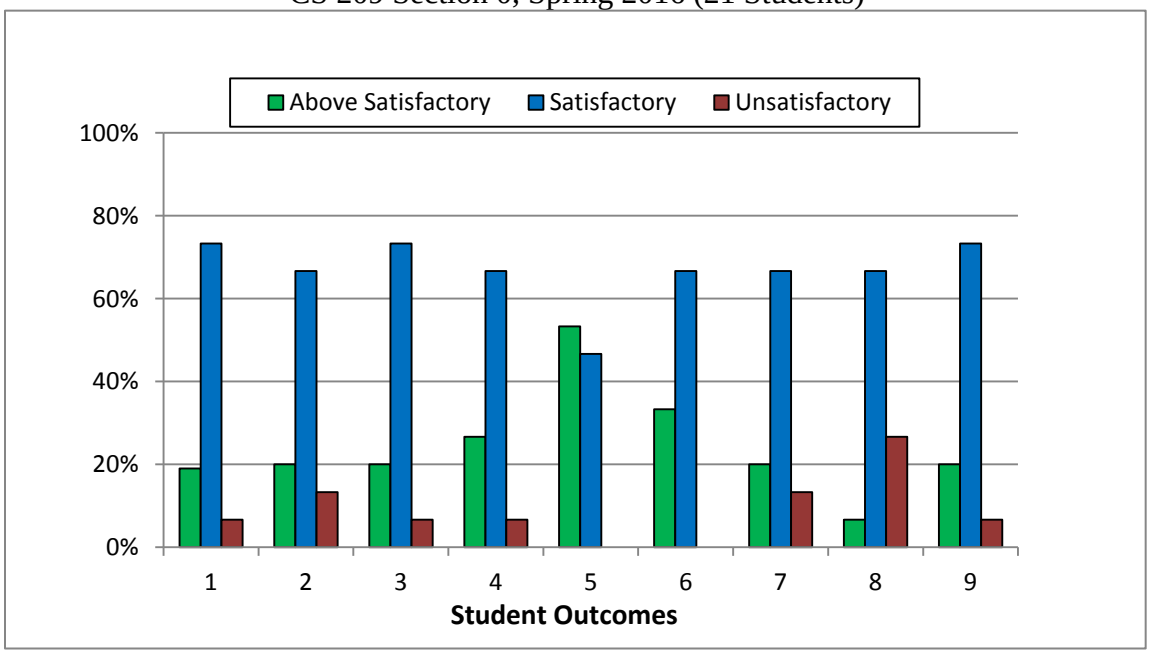


Figure 42. Course Outcomes, CS 209-0

CS 215 Section 0, Spring 2016 (34 Students)

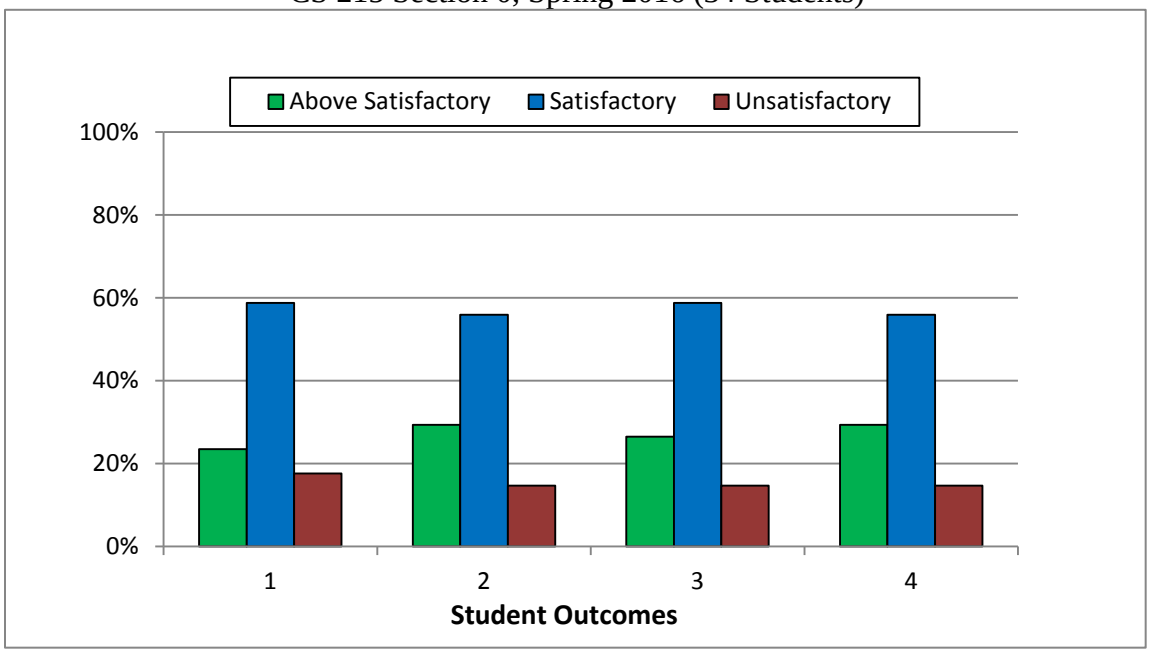


Figure 43. Course Outcomes, CS 215-0

CS 320 Section 0, Spring 2016 (11 Students)

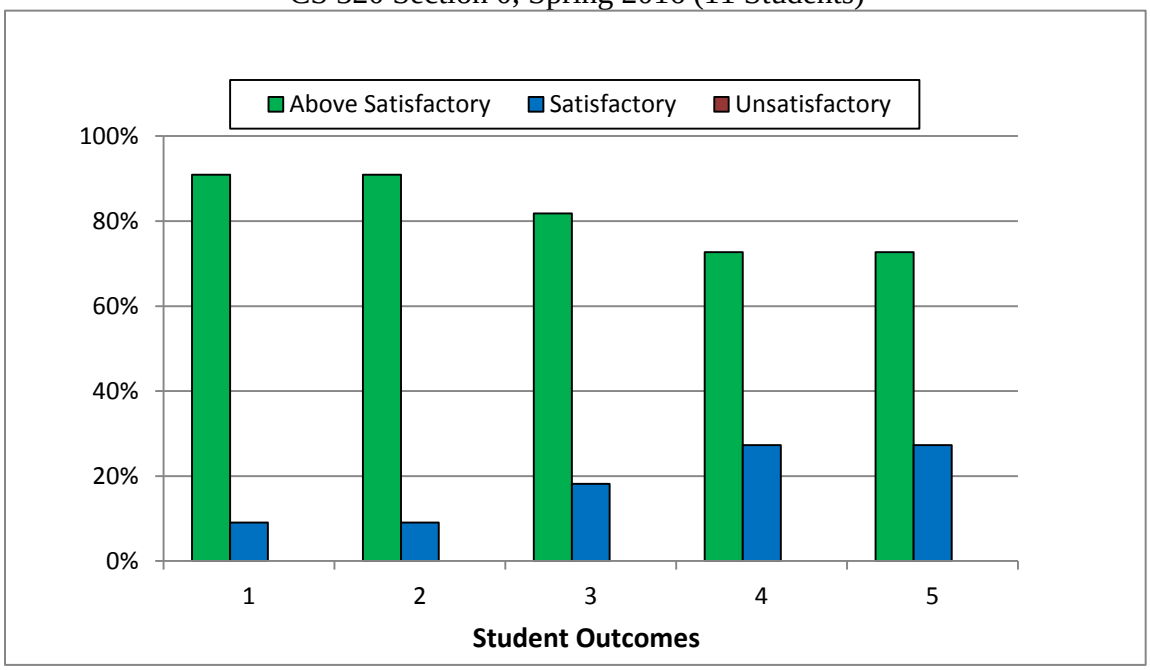


Figure 44. Course Outcomes, CS 320-0

CS 328 Section 0, Spring 2016 (19 Students)

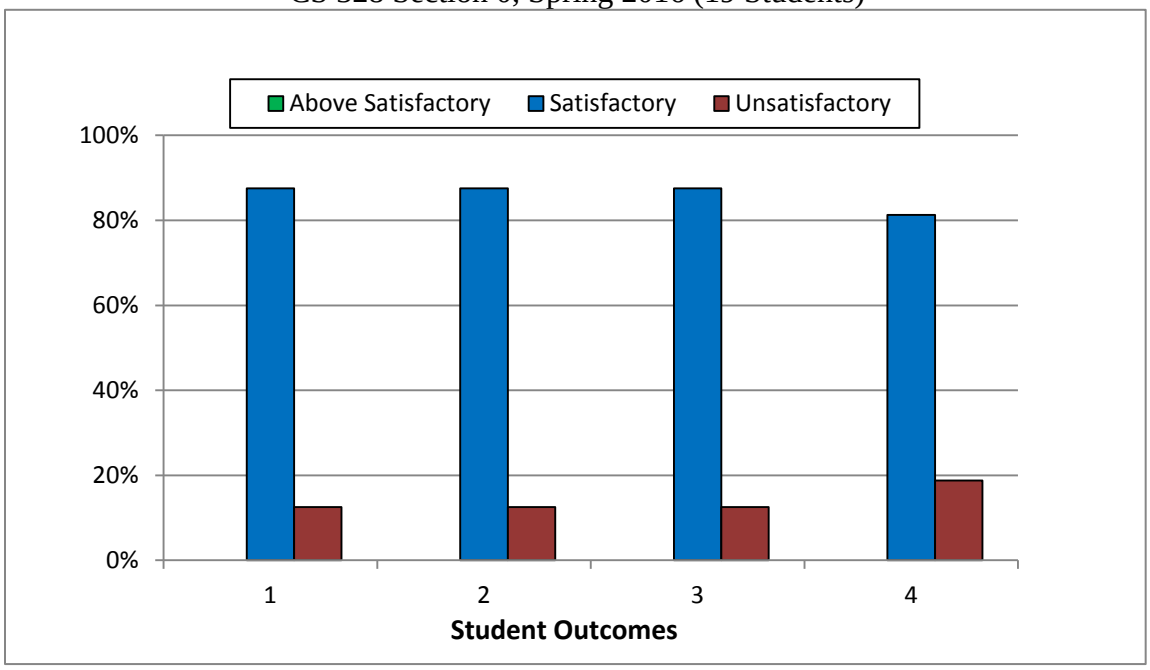


Figure 45. Course Outcomes, CS 328-0

CS 384 Section 0, Spring 2016 (23 Students)

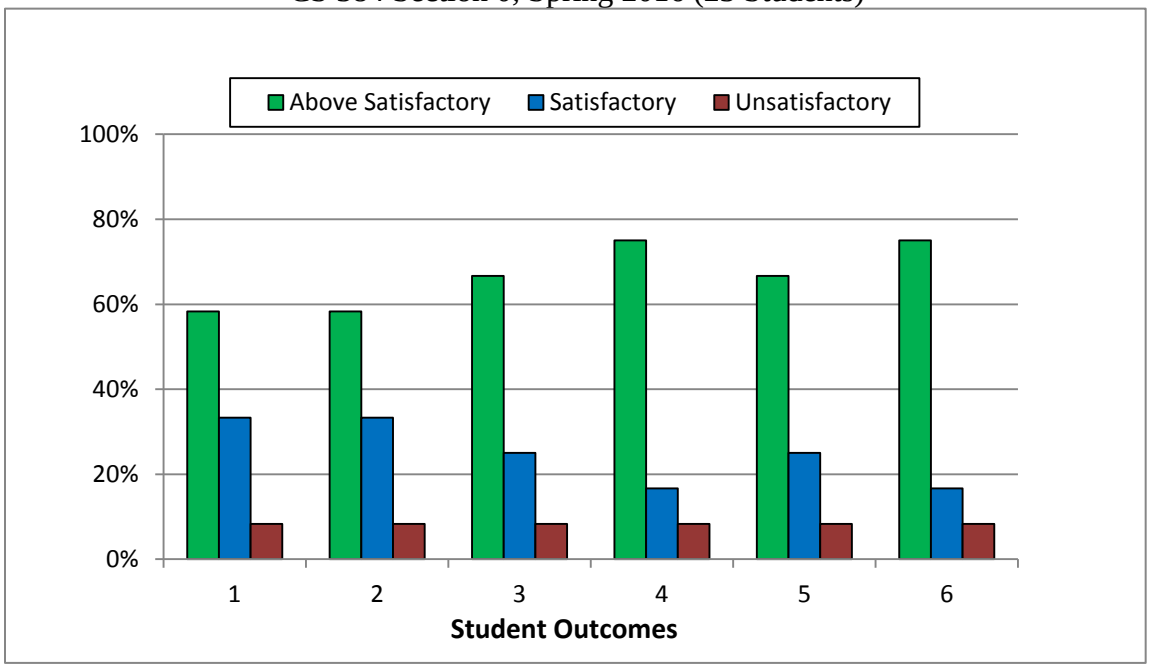


Figure 46. Course Outcomes, CS 384-0

CS 386 Section 0, Spring 2016 (17 Students)

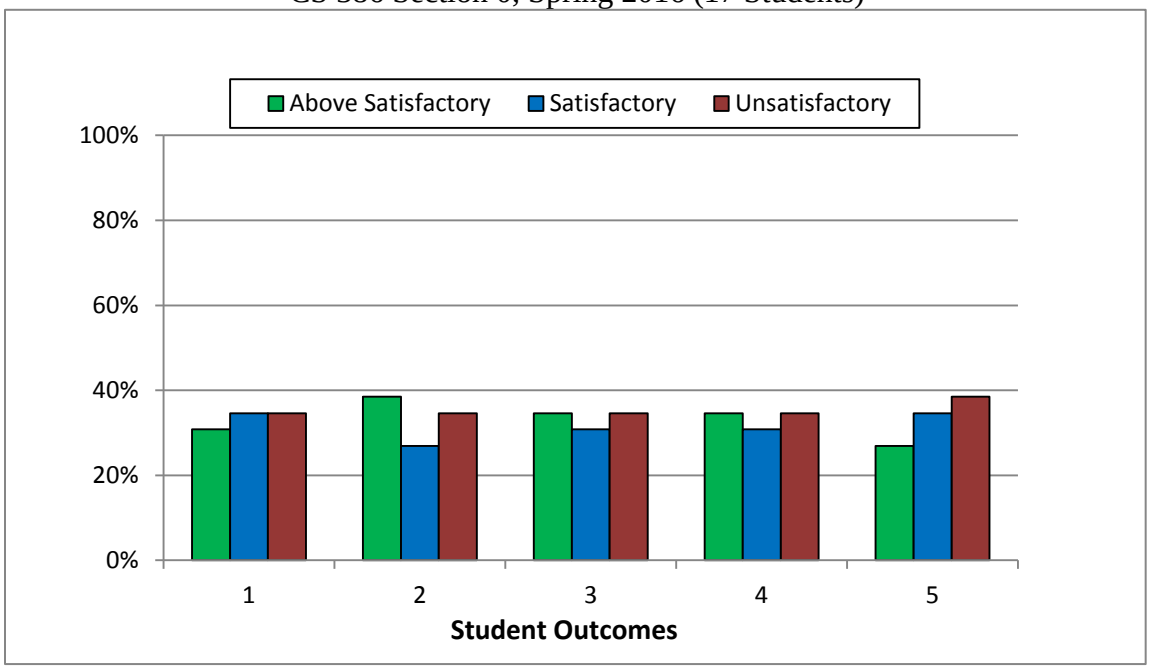


Figure 47. Course Outcomes, CS 386-0

CS 403 Section 0, Spring 2016 (17 Students)

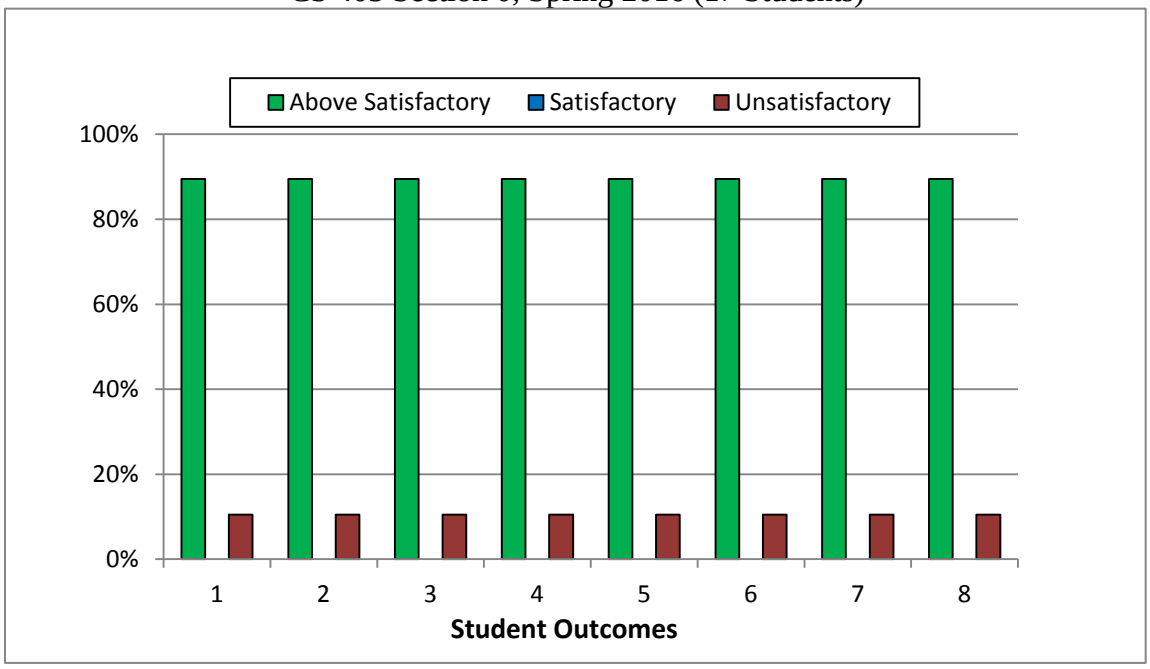


Figure 48. Course Outcomes, CS 403-0

CS 405 Section 0, Spring 2016 (13 Students)

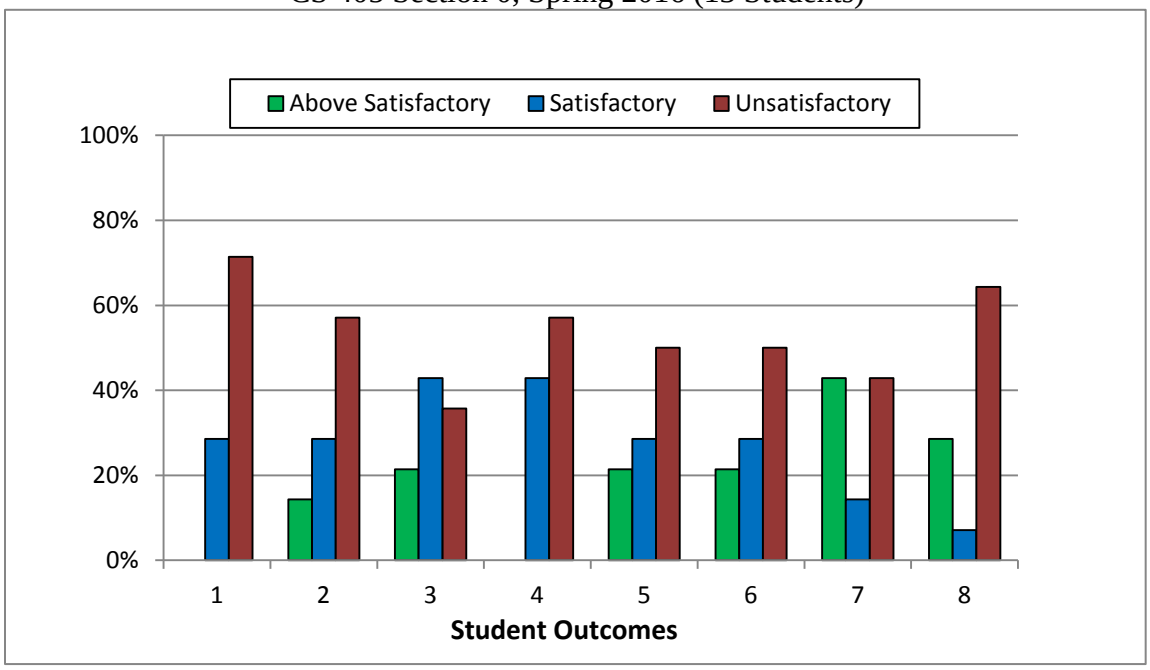


Figure 49. Course Outcomes, CS 405-0

CS 410 Section 0, Spring 2016 (13 Students)

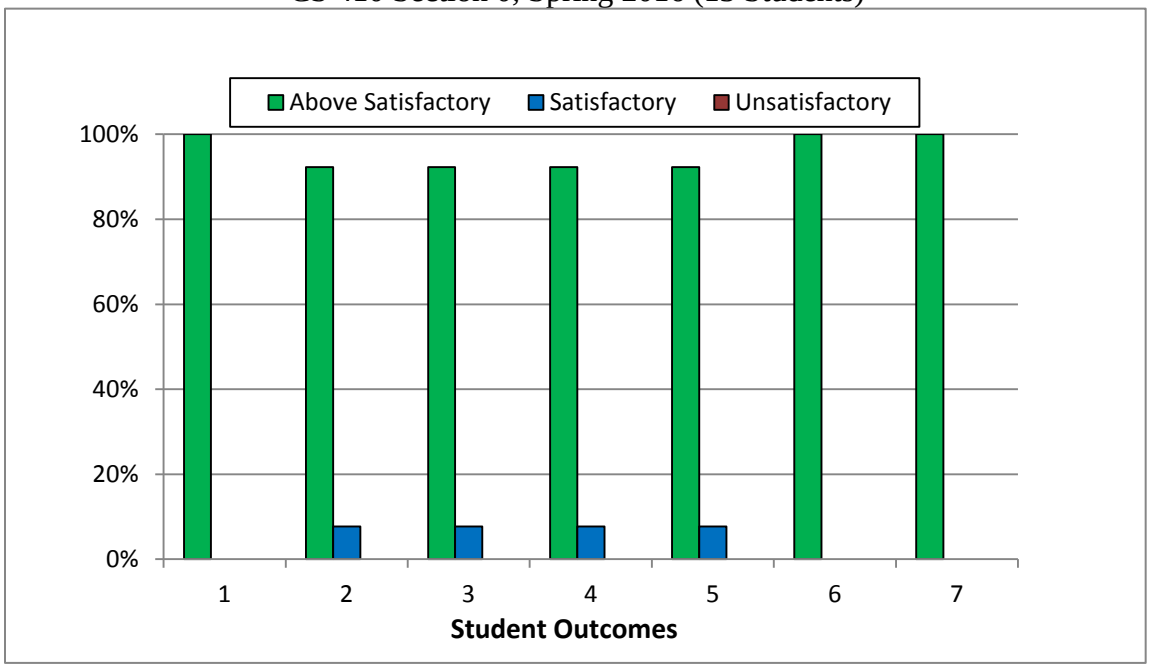


Figure 50. Course Outcomes, CS 410-0

CS 414 Section 0, Spring 2016 (14 Students)

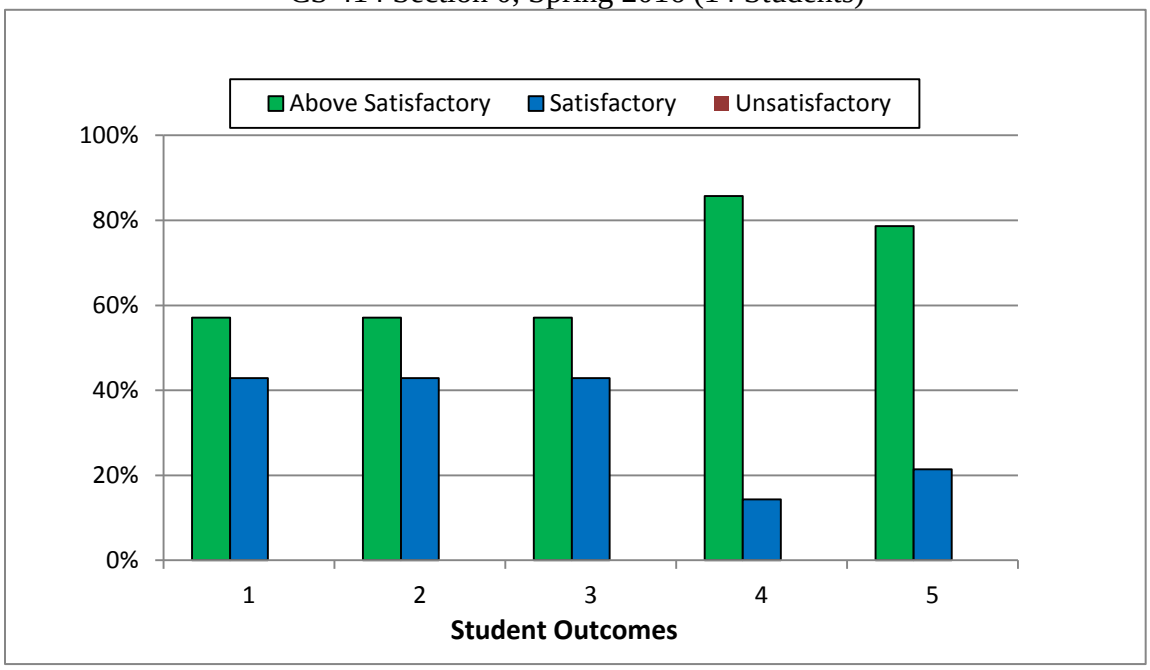


Figure 51. Course Outcomes, CS 414-0

CS 450 Section 0, Spring 2016 (5 Students)

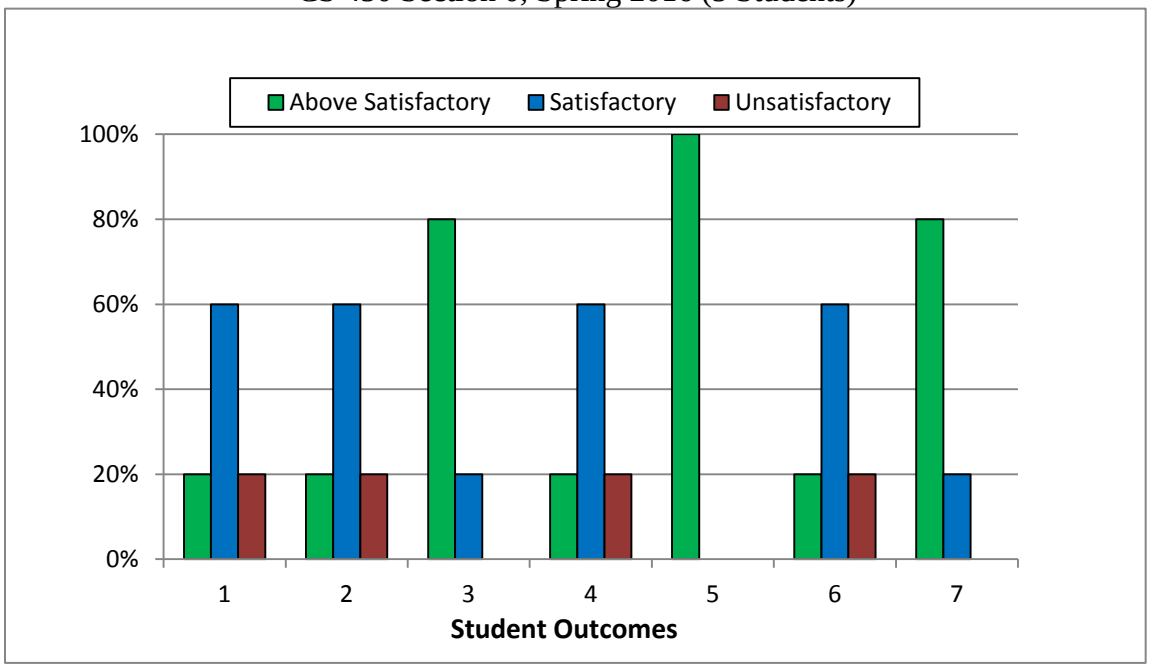


Figure 52. Course Outcomes, CS 450-0

CS 485 Section 0, Spring 2016 (7 Students)

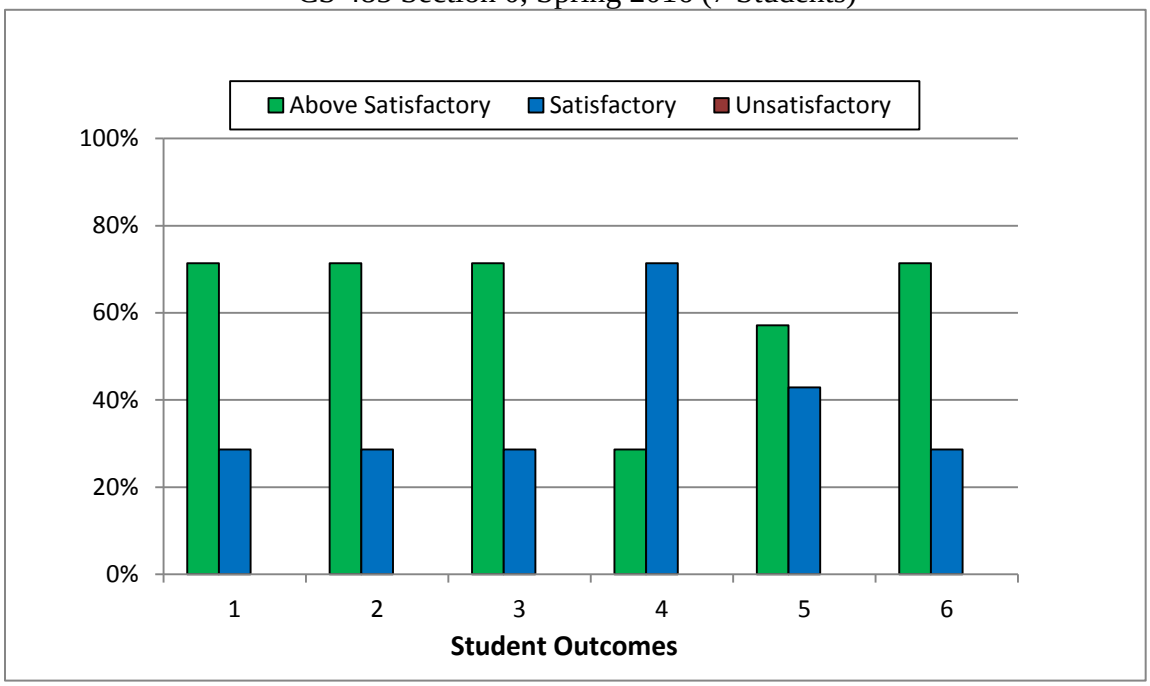


Figure 53. Course Outcomes, CS 485-0

Appendix E – Course Student Learning Outcome Rubric

Course Number and Title: CS203 Discrete Structures Assessment Semester: Fall 2015

S. No.	Performance Indicators	Unsatisfactory (Unacceptable) (0% - <40%) (0)	Satisfactory (Acceptable) (40% - <80%) (1)	Above Satisfactory (Exceptional) (80% - 100%) (2)	Target
1	Learn to read, understand, and construct mathematical arguments and proofs.	Most of the capabilities to read, understand, and construct mathematical arguments and proofs are missing	Sufficient capabilities to read, understand, and construct mathematical arguments and proofs are learnt	Most of the capabilities to read, understand, and construct mathematical arguments and proofs are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
2	Learn techniques for counting objects of different kinds.	Most of the techniques for counting objects of different kinds are missing	Sufficient techniques for counting objects of different kinds are learnt	Most of the techniques for counting objects of different kinds are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
3	Understand abstract mathematical structures that represent objects and the relationships between them. Examples are sets, permutations, relations, graphs, trees, and finite state machines.	Most of the understanding of abstract mathematical structures that represent objects and the relationships between them, are missing	Sufficient understanding of abstract mathematical structures that represent objects and the relationships between them, are learnt	Most of the understanding of abstract mathematical structures that represent objects and the relationships between them, are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
4	Learn to specify and analyze algorithms	Most of the skills to specify and analyze algorithms, are missing	Sufficient skills to specify and analyze algorithms, are learnt	Most of the skills to specify and analyze algorithms, are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
5	Learn the ability to develop new models in various domains.	Most of the abilities to develop new models in various domains, are missing	Sufficient abilities to develop new models in various domains, are learnt	Most of the abilities to develop new models in various domains, are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
	Overall Performance	**Unsatisfactory**	**Satisfactory**	**Above Satisfactory**	
	Average Points Required	**(0% - <40%)**	**(40% - <80%)**	**(80% - 100%)**	

Appendix F – Program Outcomes Assessment Tool

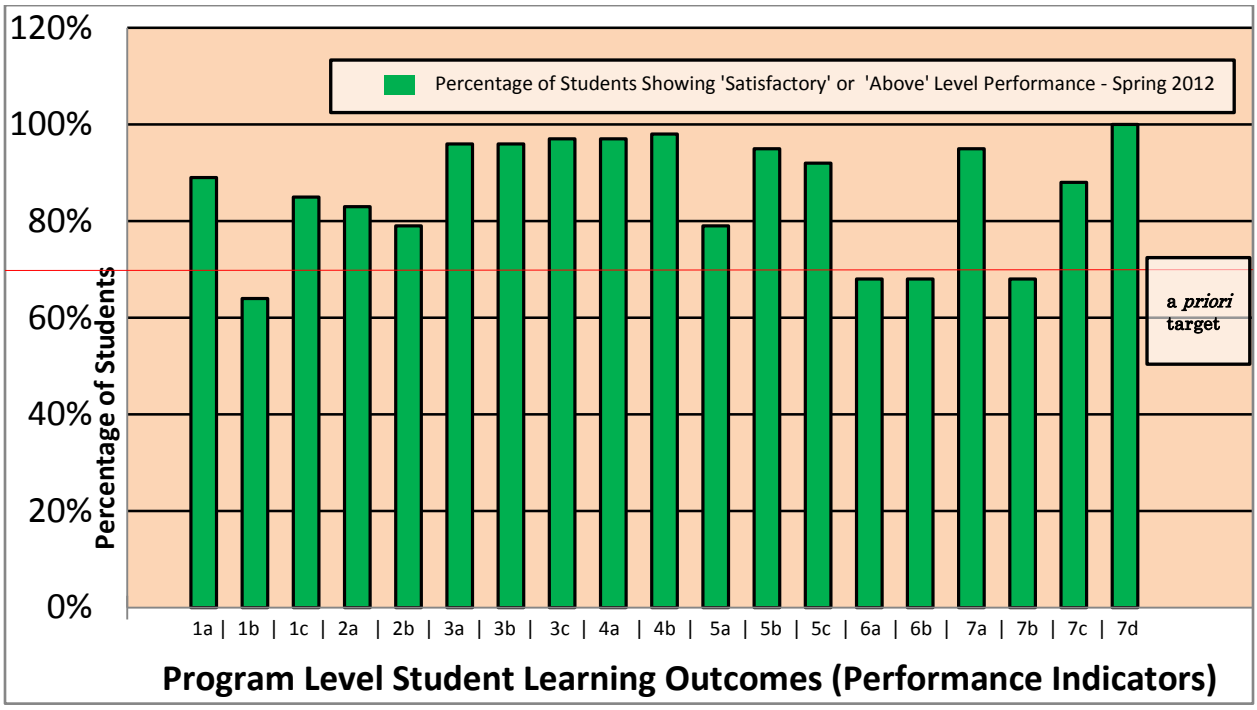
Program Outcomes Assessment Tool

Program Outcomes		1			2		3			4		5			6			7		
Number of Students	Computer Science Courses SPRING 2016	1a	1b	1c	2a	2b	3a	3b	3c	4a	4b	5a	5b	5c	6a	6b	7a	7b	7c	7d
23	102-0	16		16	16							16								
30	102-1	22		22	22							22								
24	102-2	18		18	18							18								
21	104-0	17													17	16				
16	104-1	10													8	9				
30	109-0	22		22	22							22								
12	109-1	8		6	7							7								
35	203-0				30															
41	206-0	19		19									19							
21	209-0		18		18															
34	215-0			29								29			28					
11	320-0					11														
19	328-0					14	14	14	14					14						
23	384-0		22			22									22			22		
17	386-0				17	17								17						17
17	403-0	17	17			17	17	17	17	17	17	17	17	17			17			
13	405-0					7														
13	410-0					13	13	13	13	13	13				13	13				
14	414-0					14										14		14		
5	450-0					4					5									5
7	485-0					7														
	TOTAL Students Reaching	149	57	132	150	126	44	44	44	30	35	131	36	48	88	52	17	36	0	22
	TOTAL Students Evaluated	214	61	194	192	139	49	49	49	30	35	170	58	53	107	64	17	37	0	22

- The tool is linked to each of the Course Student Learning Outcomes Assessment Tools and pulls data of each course assessment at the end of the semester for calculation of Program Outcomes
- This tool collects from each completed course, data such as the total number of students in the course, the number of students in the course who met the a priori target criteria (as mentioned in the course rubric) for each Performance Indicator of the Program Outcomes.
- It calculates the total students in the program (from all courses offered) reaching target, and total number of students in the program evaluated for a given Performance Indicator.

Appendix G – CS Program Outcome Assessment

Spring 2012

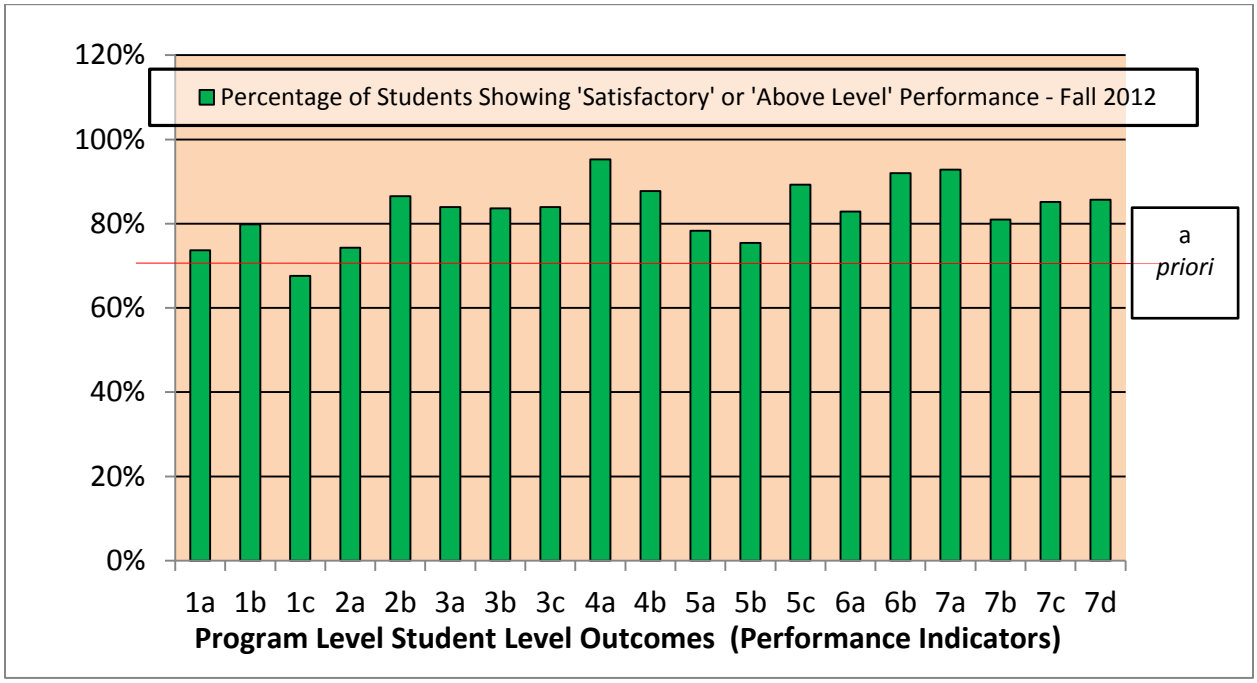


Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 1b, 6a, 6b, and 7b.

Shortcomings: The results highlighted lack of hardware and OS skills, poor performance in ethics related topics, implementation of operating system concepts.

Suggested Action(s) for the next cycle: Addition of hands-on exercises in CMP 209, 380 and 384 courses, and quizzes in CMP 104 on ethics related topics.

Fall 2012

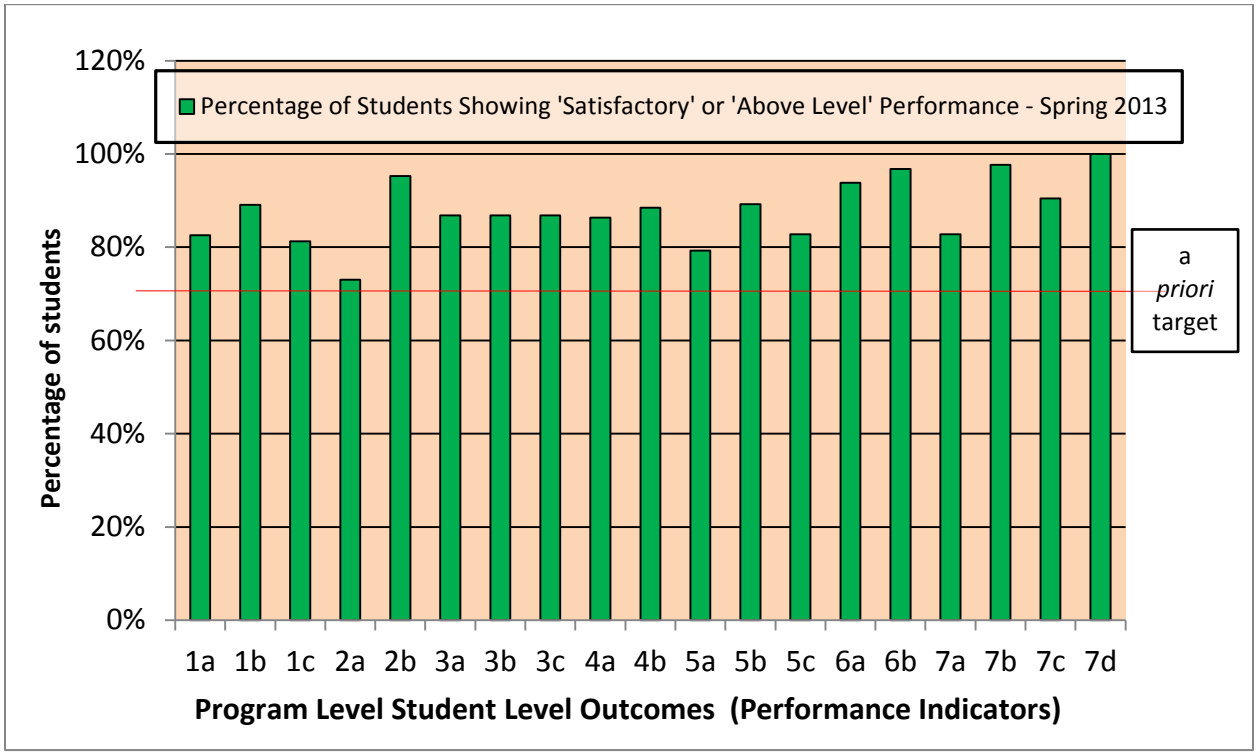


Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 1c.

Shortcomings: The results highlighted lack of basic programming skills, poor performance in programming and problem solving.

Suggested Action(s) for the next cycle: Addition of lab programming exercises in CMP 102, 109, 206, and 215 courses. All programming classes need to be taught by full-time CS faculty.

Spring 2013

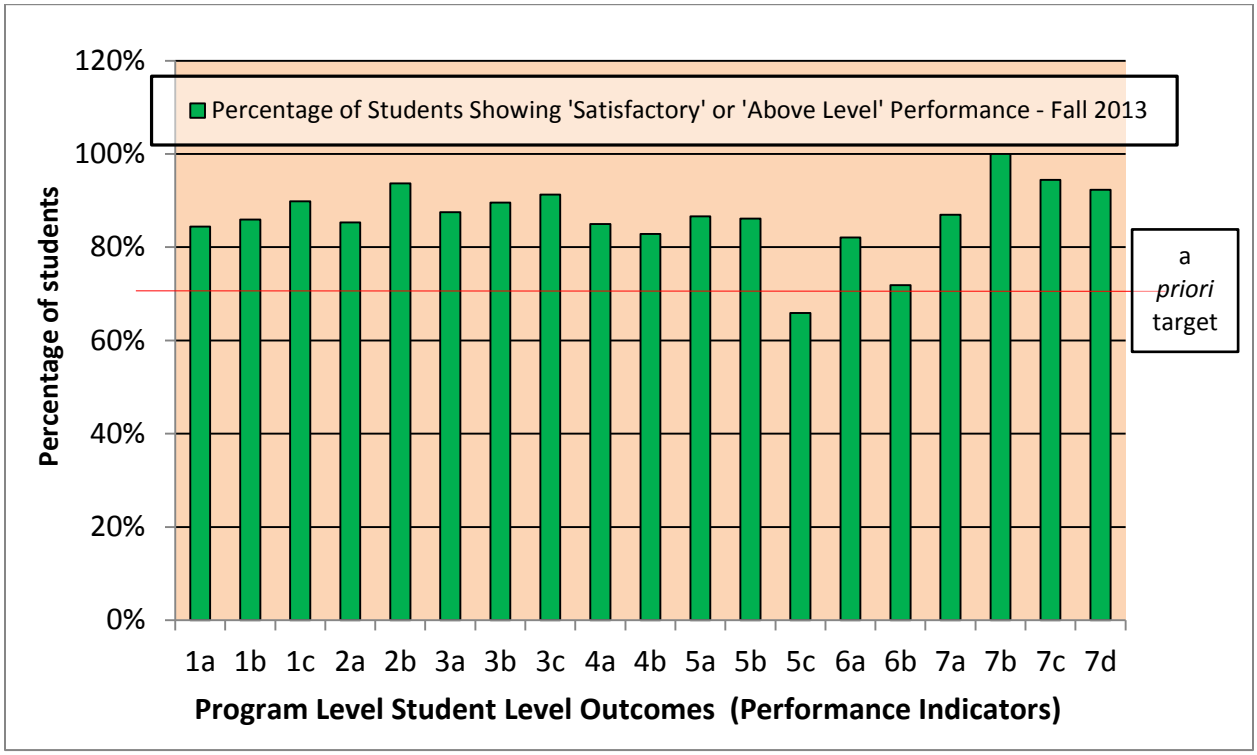


Positive Findings: All the Program Outcomes met the a priori target values.

Shortcomings: NA

Suggested Action(s) for the next cycle: NA

Fall 2013

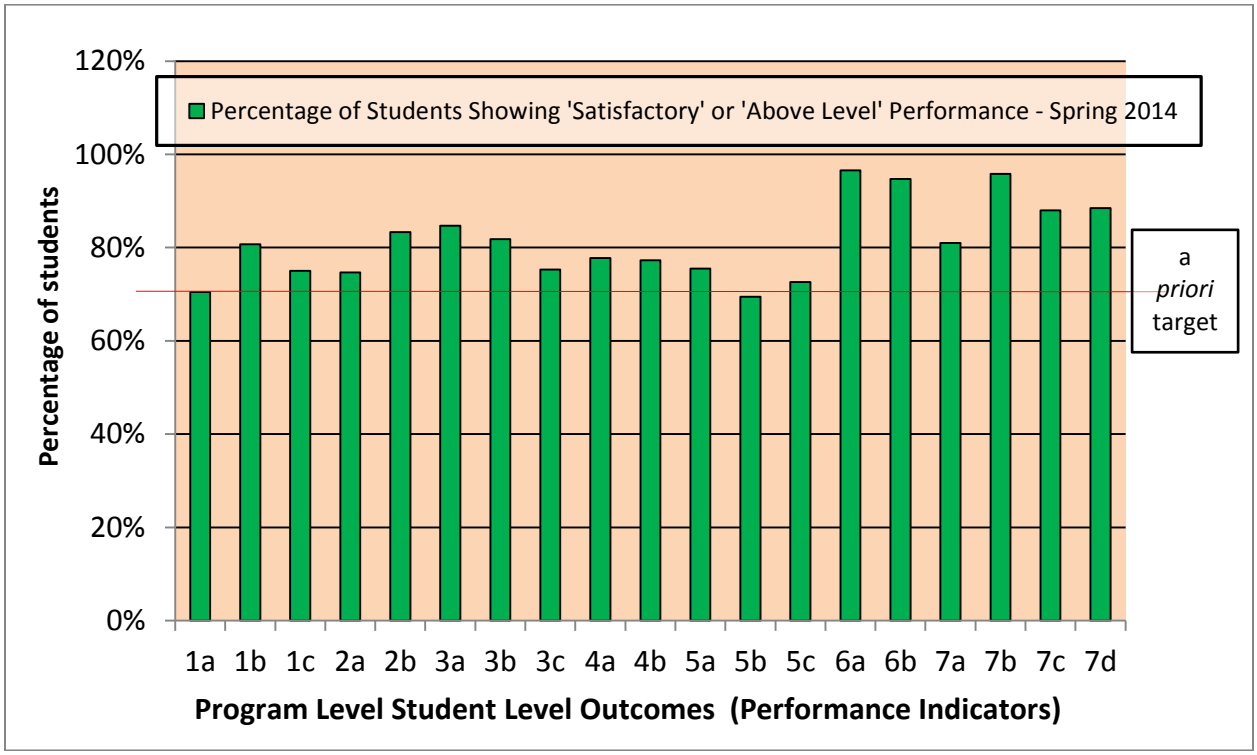


Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 5c.

Shortcomings: The results highlighted lack of capability to apply computer languages to problem solving, poor performance in software design and development.

Suggested Action(s) for the next cycle: Addition of real world projects and advanced topics in CMP 314, 315, 328, 401 and 403.

Spring 2014

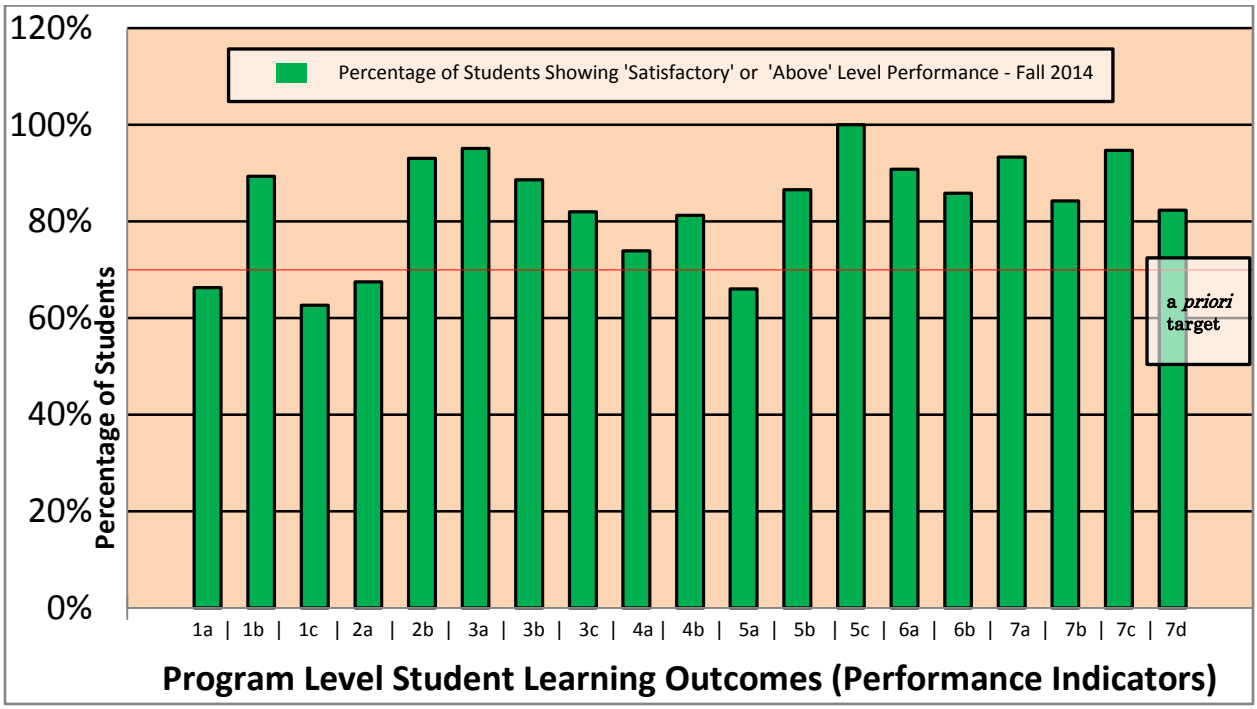


Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 1a, and 5b.

Shortcomings: The results highlighted lack of basic programming skills, poor performance in object oriented, and software engineering concepts.

Suggested Action(s) for the next cycle: Continuously implement minimum number of programming assignments, and requirement for rigorous programming in all 100-200 level programming classes. Adoption of CS401 Software Engineering/CS403 Senior Problems teaching procedure

Fall 2014

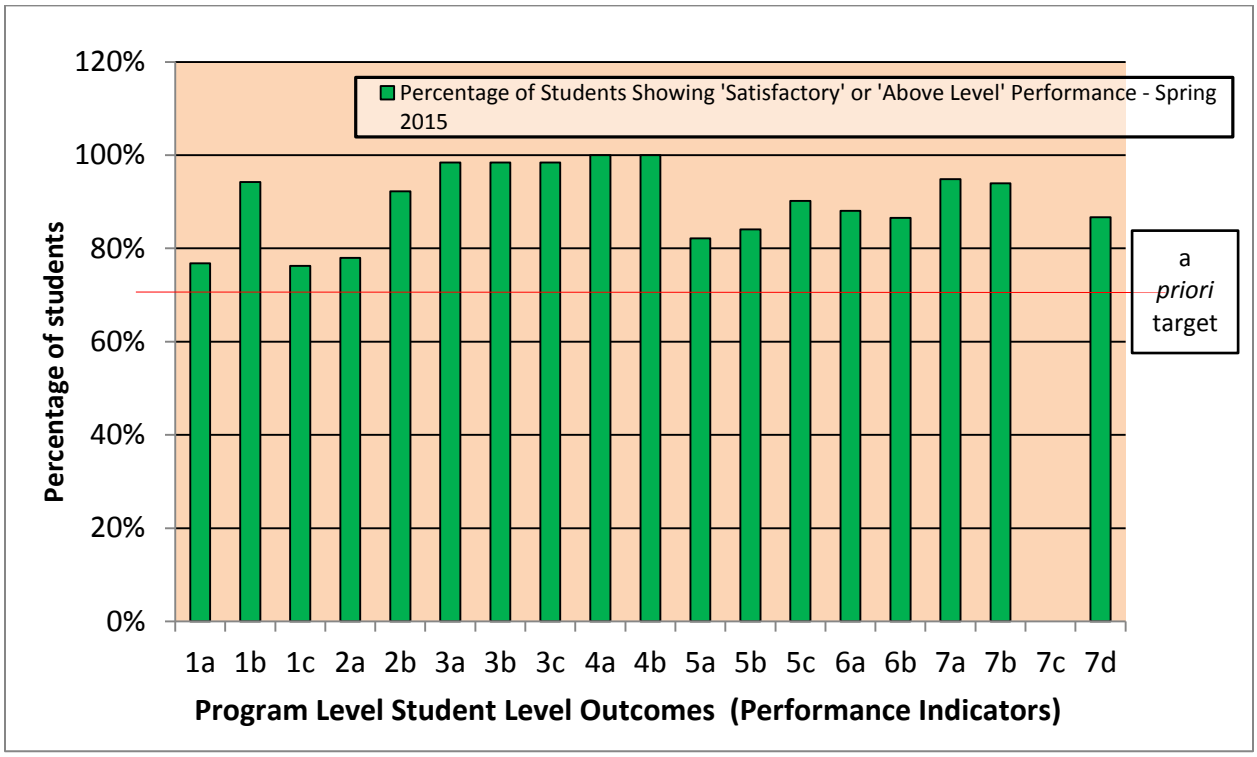


Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 1a, 1c, 2a, and 5a.

Shortcomings: The results highlighted lack of programming skills, poor performance from basic to advance programming and problem solving.

Suggested Action(s) for the next cycle: Implement minimum number of programming assignments, and requirement for rigorous programming in CS102, 109, 206, and 215.

Spring 2015

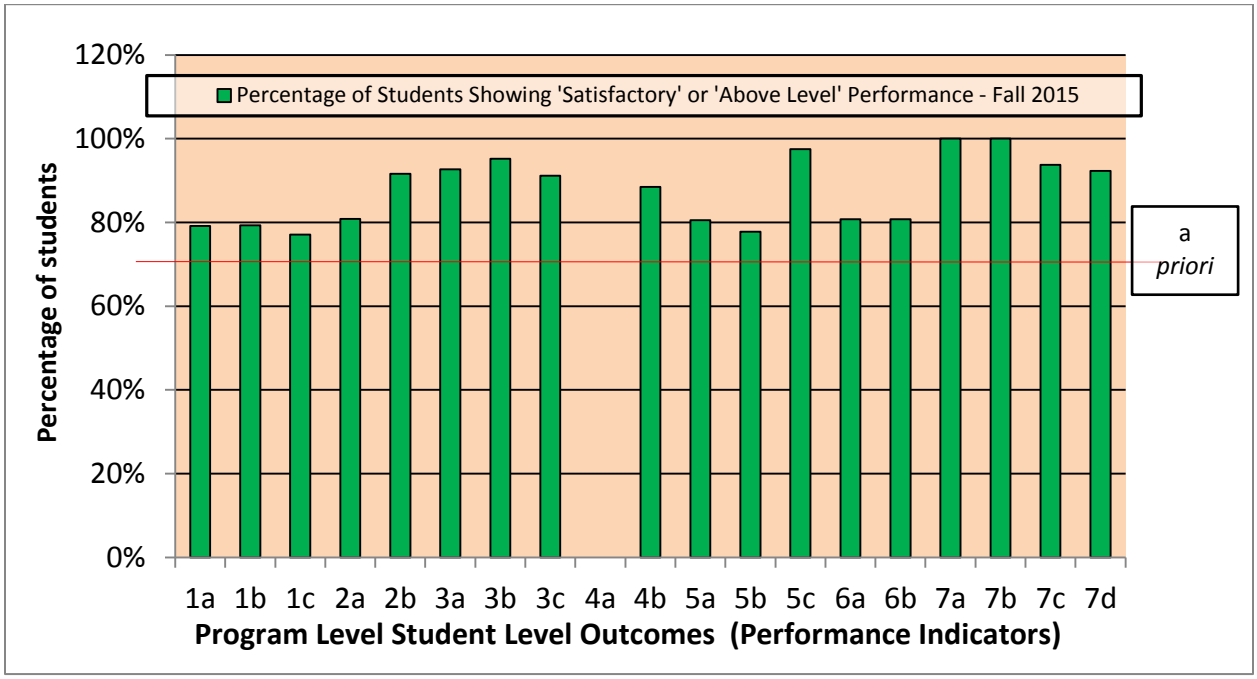


Positive Findings: All the Program Outcomes met the a priori target values. No data for 7c due to the non-offerings of CS381, and 421.

Shortcomings: NA

Suggested Action(s) for the next cycle: NA

Fall 2015

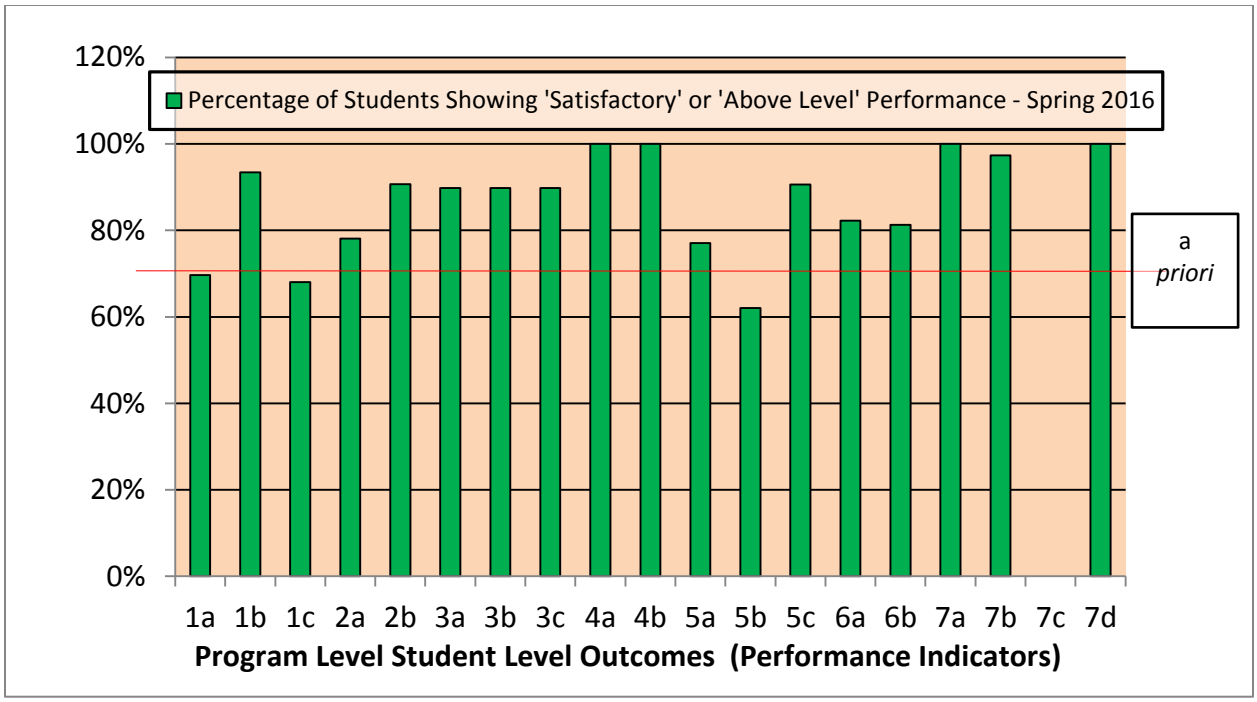


Positive Findings: All the Program Outcomes met the a priori target values. No data for 4a due to the non-offerings of CS403, and 410 (These courses are offered only in spring semester).

Shortcomings: NA

Suggested Action(s) for the next cycle: NA

Spring 2016



Positive Findings: All the Program Outcomes met the a priori target values except Program Outcome Performance Indicators 1a, 1c, and 5b. No data for 7c due to the non-offerings of CS381, and 421(These courses are offered only in fall semester).

Shortcomings: The results highlighted lack of knowledge of programming and object oriented concepts, implementation of critical concepts of programming.

Suggested Action(s) for the next cycle: Adoption of teaching materials, projects and methods from industry, taking advantage of our partnership with Google in Residence Program.

Appendix H – Assessment Activities (Surveys)

Graduating Senior Survey

Perceptions and Assessment of Education	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The advice given me by the computer science faculty advisors was accurate and of high quality					
The computing and simulation tools I needed to get my work done were readily available in my department.					
Computer science faculty members encouraged students to study in group environments.					
Lab courses were beneficial in helping to understand concepts taught in the lectures					
Courses taken in my department required that I analyze and interpret data.					
I was taught to design a system, component or process to meet a specific need.					
I was taught to function on multi-disciplinary teams.					
Ethical social and global economic and environmental issues in computer science were discussed in my undergraduate courses.					
My assignments required that I apply math, science and technology principles.					
My engineering assignments required that I solve realistic problems with multiple constraints.					
Oral and written communication skills were required in my courses.					
I made use of library and internet resources in solving problems.					
My instructors encouraged me to further my education beyond the undergraduate level.					
I plan to enhance my education by attending workshops and enrolling in graduate school.					
Computer science professors, department chairman and the Dean's office were helpful in obtaining intern and co-op positions and other technical employment.					
Overall, I feel that I have obtained a quality education here at the University.					
I would recommend AAMU to my family and friends.					

Post Graduate Employment	Yes	No
I have a post graduation job offer.		
The number of job offers I received allowed me to be both job and location selective.		
I am satisfied with the salary offered.		

Graduating Senior Survey Rubric

Assessment Semester:

Performance Indicators	Unsatisfactory (Unacceptable) (0)	Satisfactory (Acceptable) (1)	Target
The advice given me by the computer science faculty advisors was accurate and of high quality	Negative ('Disagree' and 'Strongly Disagree') Response to the Question	Positive ('Agree' and 'Strongly Disagree') Response to the Question	70% of the Surveyed Students will show a response of Level 1 (Satisfactory)
The computing and simulation tools I needed to get my work done were readily available in my department.			
Computer science faculty members encouraged students to study in group environments.			
Lab courses were beneficial in helping to understand concepts taught in the lectures			
Courses taken in my department required that I analyze and interpret data.			
I was taught to design a system, component or process to meet a specific need.			
I was taught to function on multi-disciplinary teams.			
Ethical social and global economic and environmental issues in computer science were discussed in my undergraduate courses.			
My assignments required that I apply math, science and technology principles.			
My engineering assignments required that I solve realistic problems with multiple constraints.			
Oral and written communication skills were required in my courses.			
I made use of library and internet resources in solving problems.			
My instructors encouraged me to further my education beyond the undergraduate level.			
I plan to enhance my education by attending workshops and enrolling in graduate school.			
Computer science professors, department chairman and the Dean's office were helpful in obtaining intern and co-op positions and other technical employment.			
Overall, I feel that I have obtained a quality education here at the University.			
I would recommend AAMU to my family and friends.			
I have a post graduation job offer.			
The number of job offers I received allowed me to be both job and location selective.			
I am satisfied with the salary offered.			
Overall Performance	**Unsatisfactory**	**Satisfactory**	
Average Response Required	**No**	**Yes**	

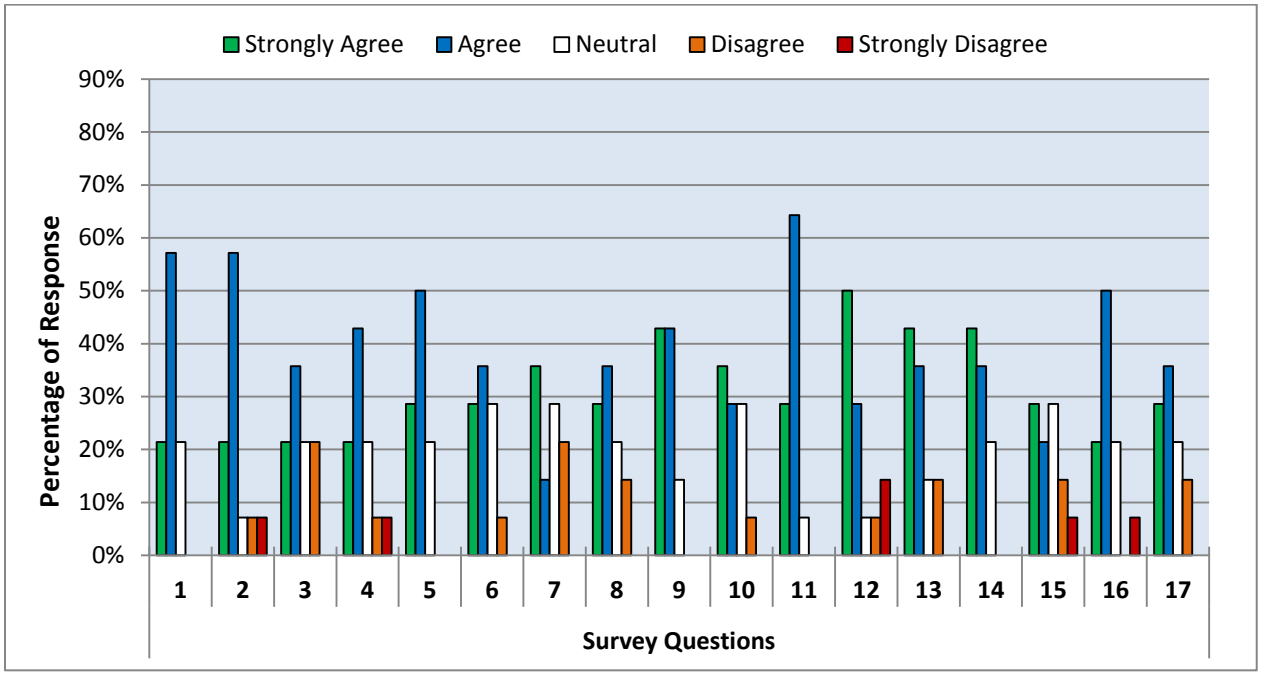
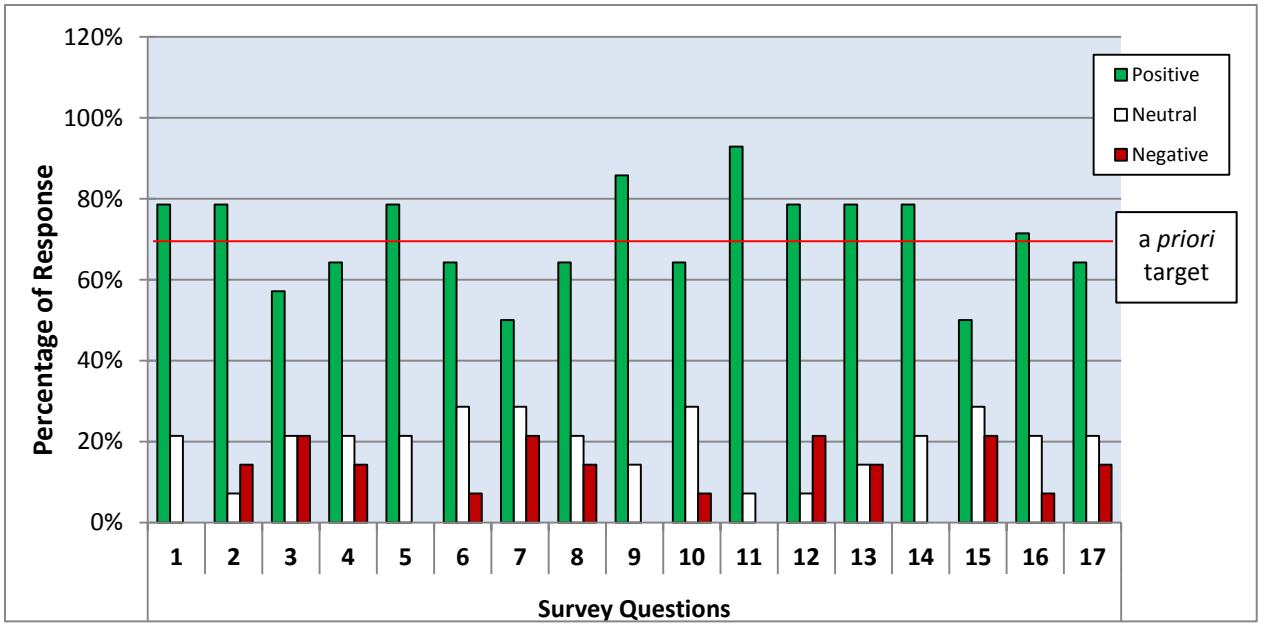
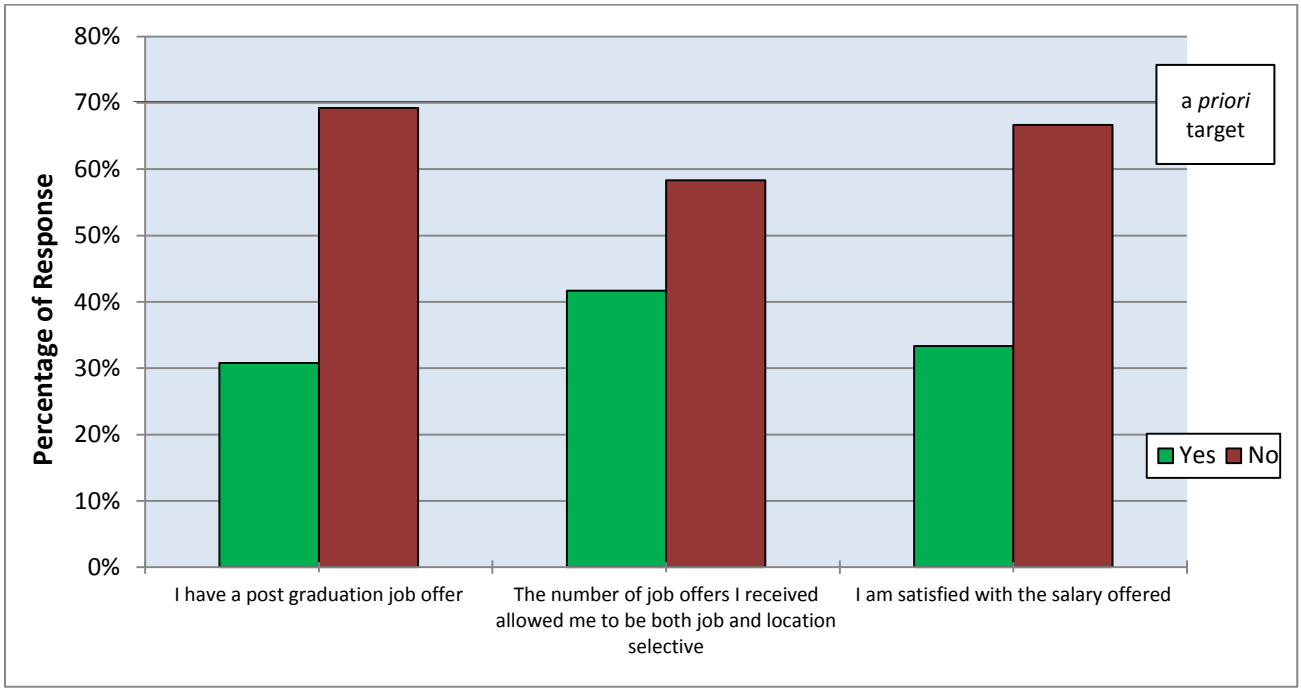


Figure Below: After pooling 'Strongly Agree' and 'Agree' as Positive and 'Disagree' and 'Strongly Disagree' as Negative response.



Positive Findings: Students' responses were overall positive to all the questions.
Short Comings: NA
Suggested Action(s) for the next cycle: NA

Graduating Senior Survey Spring 2016 – Section 2: Post Graduate Employment



Positive Findings: About 30% of the students hold a job offer.
Short Comings: None responses to the questions met the target.
Suggested Action(s) for the next cycle: Focus on strategies to prepare the students for the industry by 1) exposing to real-world CS projects, 2) increase hands-on practice, 3) encourage doing internships with the industry.

Alumni Survey Form

Part A: Personal Profile
Last Name: First Name:
Address:
City_ State: Zip:
Preferred E-Mail:
Telephone
Year/Semester of Graduation: Degree Type: Bachelor's - CS Master's- CS

If less than five years ago:

1. Did you have a job offer before you graduated? Yes No

2. Are you currently employed in a field using your degree? Yes No
If no skip to question 8……..

3. Did the number of job offers you received allow you to
be selective in both location and position? Yes No

4. Were you satisfied with your salary offer? Yes No

5. Have you experienced salary growth? Yes No

6. Have you been promoted? Yes No

7. Are you competitive with other professionals hired by your company? Yes No

8. Have you taken any further university courses in a technical field? Yes No
If Yes, What?

9. Have you taken any certification courses related to the computer field? Yes No
If Yes, What?
10. Have you taken any further education courses besides in the computing field? Yes No
If Yes, What?

Part B: Personal Opinions
The computing field is dynamic and to keep up we want to understand your personal opinions and future plans……..

1) While you were a student, the A&M CS program did a good job in:

2) List the computer science courses/topics that should be added or strengthened to make graduates more competitive.

3) What computer laboratory course(s) should be implemented or strengthened to make graduates more competitive?

4) If currently employed, the company you work for required that you learn to do, which would be good for the CS program to integrate into its program?

5) The transition from school to a technical working environment could be more easier if we:

6) The CS program could do the following to improve its program:

Part C: Rate your undergraduate experience at Alabama A&M University.
Assessment asks the following questions of our CS Graduates:

Please rate undergraduate experience, after graduation	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**N/A**
Alabama A&M CS prepared me well for my field.						
I practice my professional endeavors, communicating effectively, as a team member, or in a leadership position to the highest legal and ethical standard.						
I have realized, mentored, and/or pursued a program of continuous educational improvement for the benefit of myself and/or others in the dynamic and rapidly changing computer field.						
I can demonstrate critical knowledge, techniques, and tools of this discipline.						
I can apply appropriate and emerging mathematics, science, and engineering technologies to solve problems.						
I demonstrate the willingness to work with a team as a team member.						
I have the capabilities of writing documentations and make presentations.						
I can implement and demonstrate one or m ore computer languages to problem solving.						
I can understand the concepts in software engineering, operation systems, computer architecture, and algorithms analysis.						
While an undergraduate student, I worked than 20 hours or more per week, and this made a negative impact on my grade performance.						
My working experience during my undergraduate studies had a positive impact on me.						

Additional Comments:

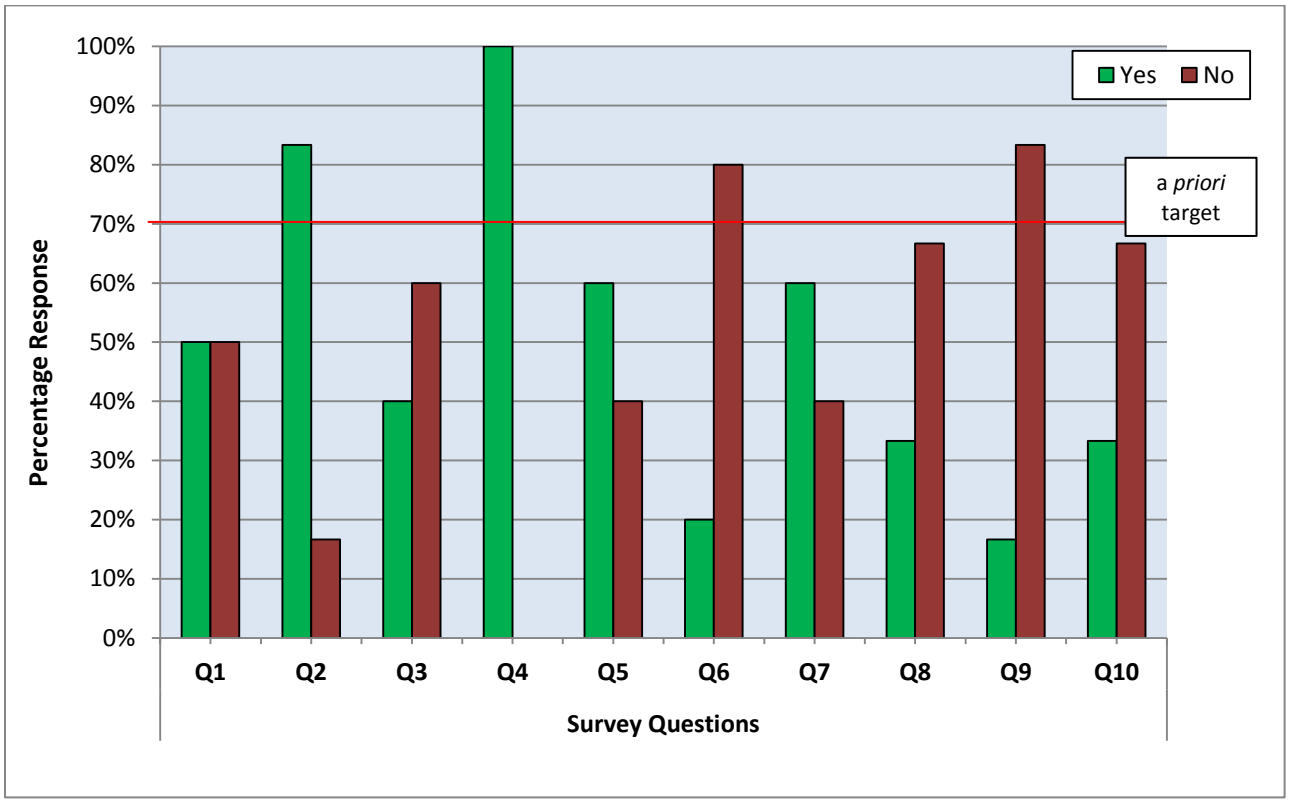
THANK YOU FOR COMPLETING THIS SURVEY!!!!!

Alumni Survey Rubric

Assessment Semester:

Performance Indicators	Unsatisfactory (Unacceptable) (0)	Satisfactory (Acceptable) (1)	Target
Did you have a job offer before you graduated?	Negative ('No') or ('Disagree' and 'Strongly Disagree') Response to the Question	Positive ('Yes') or ('Agree' and 'Strongly Disagree') Response to the Question	70% of the Surveyed Students will show a response of Level 1 (Satisfactory)
Are you currently employed in a field using your degree?			
Did the number of job offers you received allow you to be selective in both location and position?			
Were you satisfied with your salary offer?			
Have you experienced salary growth?			
Have you been promoted?			
Are you competitive with other professionals hired by your company?			
Have you taken any further university courses in a technical field?			
Have you taken any certification courses related to the computer field?			
Have you taken any further education courses besides in the computing field?			
Alabama A&M CS prepared me well for my field.			
I practice my professional endeavors, communicating effectively, as a team member, or in a leadership position to the highest legal and ethical standard.			
I have realized, mentored, and/or pursued a program of continuous educational improvement for the benefit of myself and/or others in the dynamic and rapidly changing computer field.			
I can demonstrate critical knowledge, techniques, and tools of this discipline.			
I can apply appropriate and emerging mathematics, science, and engineering technologies to solve problems.			
I demonstrate the willingness to work with a team as a team member.			
I have the capabilities of writing documentations and make presentations.			
I can implement and demonstrate one or more computer languages to problem solving.			
I can understand the concepts in software engineering, operation systems, computer architecture, and algorithms analysis.			
While an undergraduate student, I worked than 20 hours or more per week, and this made a negative impact on my grade performance.			
My working experience during my undergraduate studies had a positive impact on me.			
Overall Performance	**Unsatisfactory**	**Satisfactory**	
Average Response Required	**No**	**Yes**	

Alumni Survey Results AY2015-16 – Part A: Less Than Five Years Ago



Positive Findings: 100% students satisfied their salary offer. 84% students employed in a field using their degree. 50% students secured a job before their graduation.

Short Comings: 80% students were not promoted. About 83% students took no certification courses related to the computer field.

Suggested Action(s) for the next cycle: focus on implementing strategies to make the graduates more competitive by 1) encouraging students to take a college leadership role both in and out of the classroom, 2) increasing the skills set through more hands-on exercises, 3) exposing to real-world industry via encouraging them to pursue internships, training in real-world projects, increasing the distribution rate of possible internship opportunities.

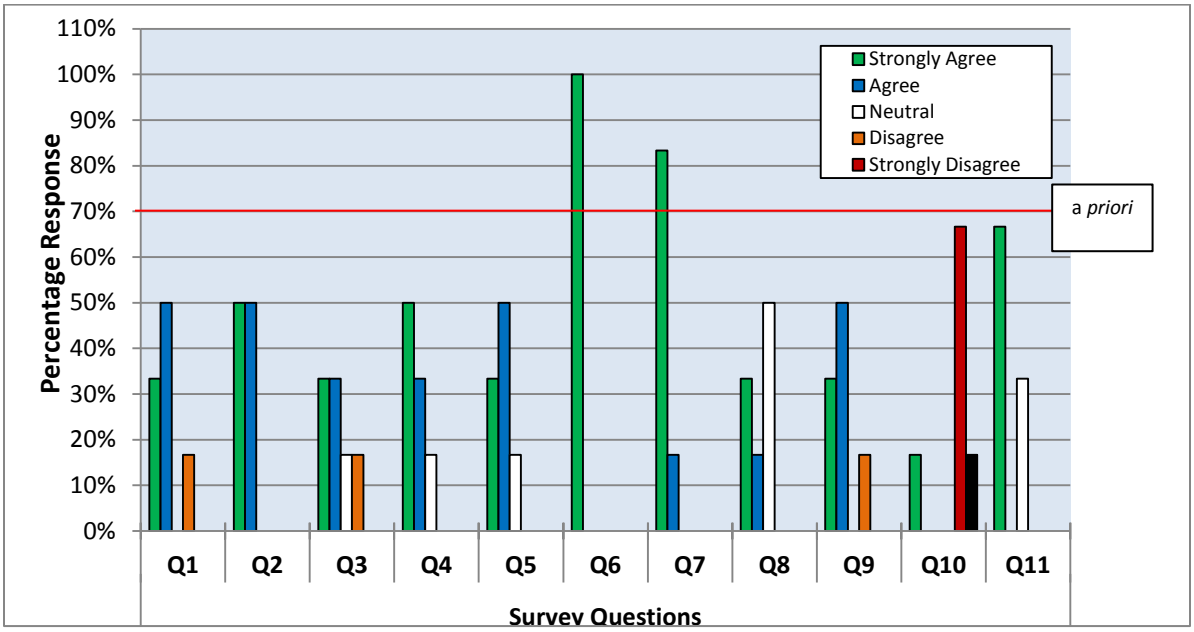
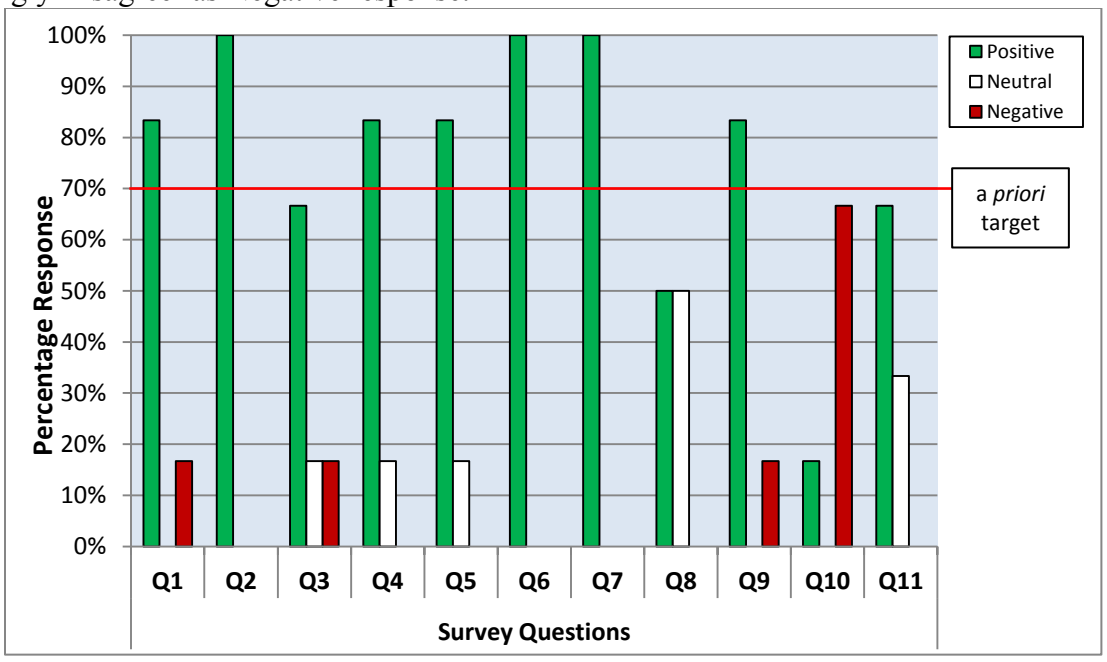


Figure Below: After pooling 'Strongly Agree' and 'Agree' as Positive and 'Disagree' and 'Strongly Disagree' as Negative response.



Positive Findings: students learnt the necessary knowledge, techniques, and tools.
Short Comings: Students' response for questions 3, 8, 10, and 11 did not meet the target.
Suggested Action(s) for the next cycle: focus on strategies to improve the students' programming skills and stress on the importance/benefits of continuous educational improvement after graduation

ALUMNI SURVEY RESULTS: Part B: PERSONAL OPINIONS, AY 2015-16

1. **While you were a student, the A&M CS program did a good job in:**

- Preparing me to deal with a variety of people and personalities
- Building a solid foundation of base knowledge. I have been able to expand on what I know and use it to help me in my chosen career. There's no way to know everything, but I have at least learned enough to really get me started, and more importantly, how to research what I don't know.
- Preparing you for real work assignments
- Providing basic understanding of a few programming languages, provided other concentrations for students such as Cyber Security, and the teachers are always willing to help students outside of the classroom, if needed.
- Keeping students aware of opportunities for internships and scholarships.
- Working closely with each individual and giving a chance to students to gain practical knowledge by giving nice projects.

2. **List the computer science courses/topics that should be added to make graduates more competitive:**

- Technical Writing
- Maybe strengthening the programming classes by having more languages available to learn. Also, classes on embedded systems and physically working with computer hardware would be helpful.
- Statistical Methods (Quantitative Methods)
- Java and JavaScript, AngularJS
- The programming courses should be strengthened and should be used to help students strengthen their programming skills. There should be heavy emphasis on java as I have found that most companies are looking for people who know this specific language. Give the students more elective options to help them to find subjects within the field that they may be interested in.
- Big Data
- Python, additional Linux courses to re-inforce command line computing.

3. **What computer laboratory course(s) should be implemented to make graduates more competitive:**

- Python
- Security and Java
- Being able to use lab time for teachers to help students with programming
- Cloud Related Courses
- Cannot comment on the graduate program

4. **If currently employed, the company you work for required that you learn easier ways to solve problems such as utilizing massive libraries instead of the older**

methods AAMU teaches which would be good for the CS program to integrate into its program?

- Courses on Systems Engineering
- AngularJS and Bootstrap
- Matlab and Geospatial software along with a lot of Linux command line on top of the technical skills acquired during the CS program

5. **The transition from school to a technical working environment could be more easier if we:**

- Performed more practical coding exercises in different languages
- More experience in the most used programming language instead of C++
- Prepare students better by correlating what is learned in the classroom and the skills companies are searching for in new hires.
- Aside from re-iterating the importance of technical skills, students should be prepared to convey that technical knowledge or ideas in a workplace setting.
- Concentrate on latest cutting edge technology

6. **The CS program could do the following to improve its program:**

- Teach more up-to-date languages and what jobs look for nowadays in entry-level – jr level programmers.
- Try to keep up with the pace of the industry so students are more prepared for internships and co-op opportunities
- Include new technologies in course curriculum

ADDITIONAL COMMENTS

None

The above questions in Part B of the Alumni Survey require narrative responses and, due to the difficulty of quantifying narrative responses in assessing whether the Program Educational Objectives are being met, only the discrete responses (part 1 and 3) of the Alumni Survey were considered for that purpose. However, these narrative inputs are used to measure whether the program is preparing its students for careers in computing and associating technology fields, Program Educational Objective 'a' (They will work in careers in computing and associated technology fields).

Positive Findings: The CS program has already been implementing some of the suggestions (highlighted in green above) from the Alumni such as providing information on various internships and jobs, add additional programming languages, advanced java, Unix/Linux, Cyber security, advanced programming. More programming in courses and more hands on experience, and program software available in all labs, etc.

Short Comings: There are several (shown in yellow highlight) the alumni suggested that the program has yet to offer.

Suggested Action(s) for the next cycle: Focus on implementing strategies to expose students to real-world industry problems via the class projects.

Employer Survey Form
For
Computer Science
College of Engineering, Technology, and Physical Sciences
Alabama A&M University (AAMU)

Is the AAMU graduate classified as an engineer or professional employee? Yes __ No __
How well did the employee's education prepare him/her for professional practice? _____
_____
_____

Employee Performance

Using the following criteria, please rate your employees.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
AAMU graduates have the technical skills required for their job assignments.					
AAMU graduates have the ability to communicate effectively both verbally and in writing.					
AAMU graduates have the ability to function on multi-disciplinary teams.					
AAMU graduates have an understanding of professional and ethical responsibility in professional practice.					
AAMU graduates have a recognition of the need for, and an ability to engage in life long learning.					
AAMU graduates are competitive with other young professionals hired by my company.					
I would recommend that my company hire more graduates from Alabama A&M University, College of Engineering, Technology and Physical Sciences, Computer Science Program.					

Comments: (Please add your perceptions about the employee's career preparation strengths and weaknesses.)

Employer Survey Rubric

Assessment Semester:

Performance Indicators (Employer Survey Non-narrative Questions)	Unsatisfactory (Unacceptable) (0)	Satisfactory (Acceptable) (1)	Target
AAMU graduates have the technical skills required for their job assignments.	Negative ('Disagree' and 'Strongly Disagree') Response to the Question	Positive ('Agree' and 'Strongly Agree') Response to the Question	70% of the Surveyed Employers of AAMU CS graduates will show a positive Response of Level 1 (Satisfactory)
AAMU graduates have the ability to communicate effectively both verbally and in writing.			
AAMU graduates have the ability to function on multi-disciplinary teams.			
AAMU graduates have an understanding of professional and ethical responsibility in professional practice.			
AAMU graduates have a recognition of the need for, and an ability to engage in life long learning.			
AAMU graduates are competitive with other young professionals hired by my company.			
I would recommend that my company hire more graduates from Alabama A&M University, College of Engineering, Technology and Physical Sciences.			
Overall Performance	**Unsatisfactory**	**Satisfactory**	
Average Response Required	**No**	**Yes**	

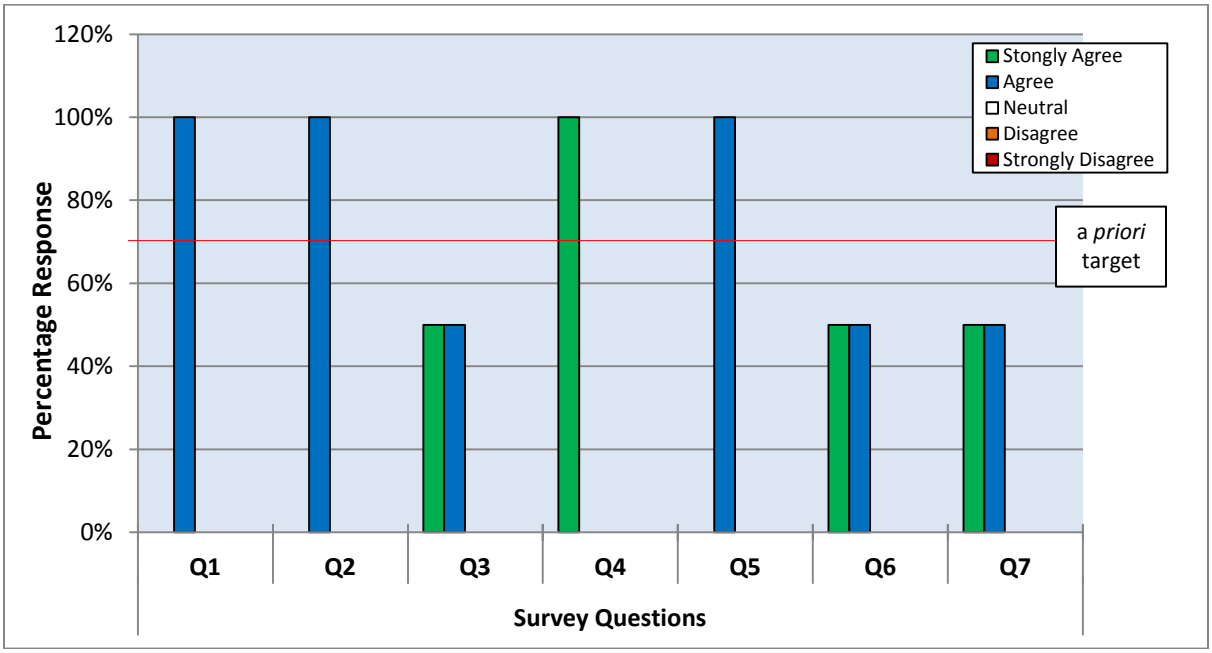
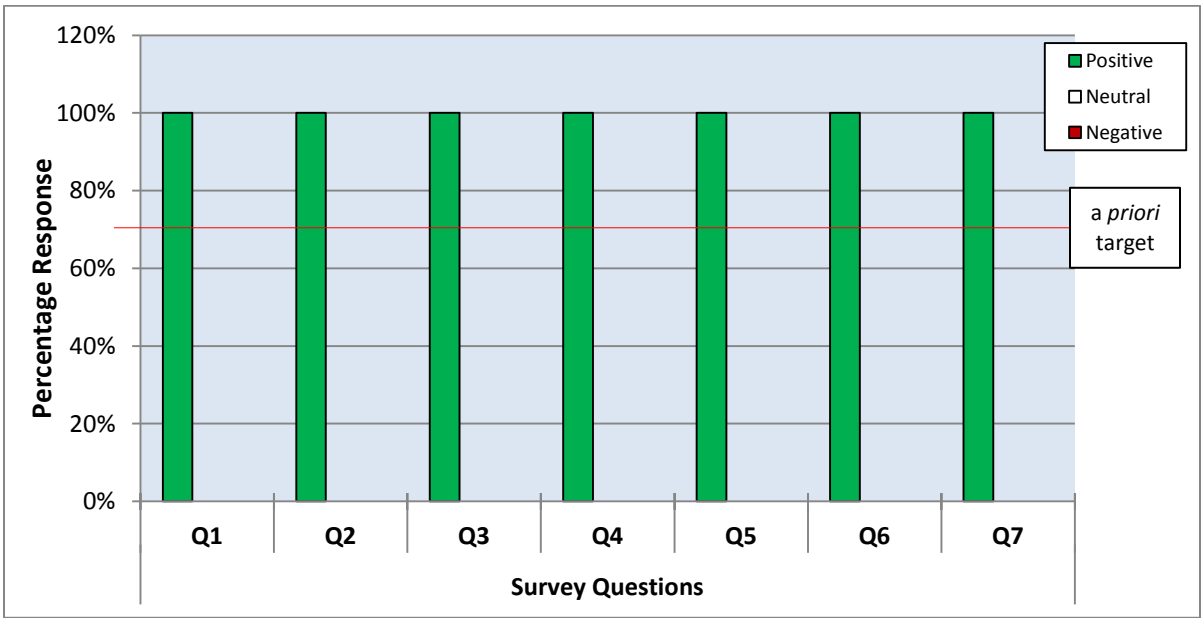


Figure Below: After pooling 'Strongly Agree' and 'Agree' as Positive and 'Disagree' and 'Strongly Disagree' as Negative response.



Suggested Action(s) for the next cycle: The cycle for employer survey is scheduled from Fall 2014 to Spring 2016. We have requested but so far we have received only two feedbacks. The EECS industrial advisor board will be requested to get involved in collecting these surveys.

Faculty Course Evaluation Form

Students are an important source of information about the effectiveness of a course, its instructor, and its teaching methods. Using a pencil or pen, please fill in the category that applies to you and your level of agreement with each of the following statements:

Gender	Age	Classification	GPA	Race/Ethnicity
☐ Male	☐ under 21	☐ Graduate	☐ Less than 2.0	☐ African American or Black
☐ Female	☐ 21-24	☐ Senior	☐ 2.0-2.4	☐ White
	☐ 25-29	☐ Junior	☐ 2.5-2.9	☐ Hispanic or Latino
	☐ 30-39	☐ Sophomore	☐ 3.0-3.4	☐ Asian/Pacific Islander
	☐ 40-older	☐ Freshman	☐ 3.5-4.0	☐ American Indian/Alaskan
				☐ Other _____

Note: Write any comments on back of form.

Please select the best response to each statement.	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
1. The instructor's objectives for the course have been made clear.	☐	☐	☐	☐	☐
2. The instructor made class policies, such as attendance, grading, behavior, etc., clear at the beginning of the semester.	☐	☐	☐	☐	☐
3. The instructor began and ended class on time.	☐	☐	☐	☐	☐
4. The instructor creates and maintains a positive and supportive learning environment.	☐	☐	☐	☐	☐
5. The instructor has current professional knowledge and abilities.	☐	☐	☐	☐	☐
6. The instructor presented the subject matter in a clear and organized manner.	☐	☐	☐	☐	☐
7. The instructor was well-prepared for each class.	☐	☐	☐	☐	☐
8. The pace at which the instructor covered the subject matter was appropriate.	☐	☐	☐	☐	☐
9. The instructor effectively assesses student learning.	☐	☐	☐	☐	☐
10. The instructor returned tests and assignments within a reasonable amount of time.	☐	☐	☐	☐	☐
11. The instructor effectively facilitates learning by all students.	☐	☐	☐	☐	☐
12. The instructor was available for extra help.	☐	☐	☐	☐	☐
13. The instructor is a proficient and effective communicator.	☐	☐	☐	☐	☐
14. The instructor exhibits professional dispositions at all times.	☐	☐	☐	☐	☐
15. The instructor seemed genuinely concerned with students' progress.	☐	☐	☐	☐	☐
16. The instructor was open to students' viewpoints.	☐	☐	☐	☐	☐
17. The instructor seemed to enjoy teaching.	☐	☐	☐	☐	☐
18. The instructor is available during office hours.	☐	☐	☐	☐	☐
19. The instructor engages in continuous professional development.	☐	☐	☐	☐	☐
20. Overall, I rate this as a very good course.	☐	☐	☐	☐	☐

Faculty Course Evaluation Rubric

Assessment Semester:

Performance Indicators	Unsatisfactory (Unacceptable) (0)	Satisfactory (Acceptable) (1)	Target
The instructor's objectives for the course have been made clear.	Negative ('Disagree' and 'Strongly Disagree') Response to the Question	Positive ('Agree' and 'Strongly Disagree') Response to the Question	70% of the Surveyed Students will show a response of Level 1 (Satisfactory)
The instructor made class policies, such as attendance, grading, behavior, etc., clear at the beginning of the semester.			
The instructor began and ended class on time.			
The instructor creates and maintains a positive and supportive learning environment.			
The instructor has current professional knowledge and abilities.			
The instructor presented the subject matter in a clear and organized manner.			
The instructor was well prepared for each class.			
The pace at which the instructor covered the subject matter was appropriate.			
The instructor effectively assesses student learning.			
The instructor returned tests and assignments within a reasonable amount of time.			
The instructor effectively facilitates learning by all students.			
The instructor was available for extra help			
The instructor is a proficient and effective communicator.			
The instructor exhibits professional dispositions at all times.			
The instructor seemed genuinely concerned with students' progress.			
The instructor was open to students' viewpoints.			
The instructor seemed to enjoy teaching.			
The instructor is available during office hours.			
The instructor engages in continuous professional development.			
Overall, I rate this as a very good course.			
Overall Performance	**Unsatisfactory**	**Satisfactory**	
Average Response Required	**No**	**Yes**	

Mapping of Alumni Survey to Program Educational Objectives

	Program Educational Objectives		
	a	**b**	**c**
Alumni Survey Questions **Part A:**	They will work in careers in computing and associated technology fields.	They will practice their professional endeavors, communicating effectively, as team members, in leadership positions to the highest legal and ethical standards.	They will realize, mentor, and pursue a program of continuous educational improvement for the benefit of themselves and others in our dynamic and rapidly changing field.
1. Did you have a job offer before you graduated?	X		
2. Are you currently employed in a field using your degree?	X		
3. Did the number of job offers you received allow you to be selective in both location and position?	X		
4. Were you satisfied with your salary offer?	X		
5. Have you experienced salary growth?	X		
6. Have you been promoted?		X	
7. Are you competitive with other professionals hired by your company?			X
8. Have you taken any further university courses in a technical field?			X
9. Have you taken any certification courses related to the computer field?			X
10. Have you taken any further education courses besides in the computing field?			X
Part C: Please rate undergraduate experience, after graduation			
Alabama A&M CS prepared me well for my field.	X		
I practice my professional endeavors, communicating effectively, as a team member, or in a leadership position to the highest legal and ethical standard.		X	
I have realized, mentored, and/or pursued a program of continuous educational improvement for the benefit of myself and/or others in the dynamic and rapidly changing computer field.			X
I can demonstrate critical knowledge, techniques, and tools of this discipline.	X		
I can apply appropriate and emerging mathematics, science, and engineering technologies to solve problems.			X
I demonstrate the willingness to work with a team as a team member.		X	
I have the capabilities of writing documentations and make presentations.		X	
I can implement and demonstrate one or more computer languages to problem solving.	X		
I can understand the concepts in software engineering, operation systems, computer architecture, and algorithms analysis.	X		

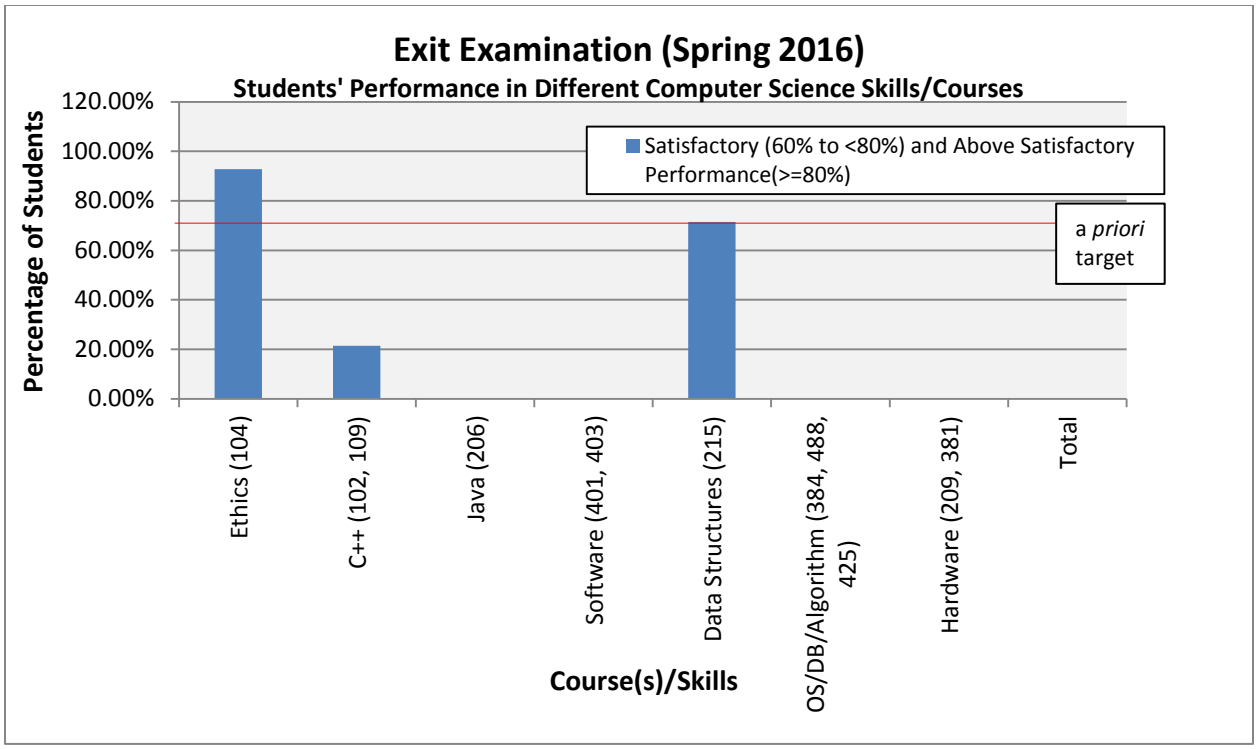
Mapping of Employer Survey to Program Educational Objectives			
	Program Educational Objectives		
	a	b	c
Employer Survey Questions	They will work in careers in computing and associated technology fields.	They will practice their professional endeavors, communicating effectively, as team members, in leadership positions to the highest legal and ethical standards.	They will realize, mentor, and pursue a program of continuous educational improvement for the benefit of themselves and others in our dynamic and rapidly changing field.
AAMU graduates have the technical skills required for their job assignments.	X		
AAMU graduates have the ability to communicate effectively both verbally and in writing.		X	
AAMU graduates have the ability to function on multi-disciplinary teams.		X	
AAMU graduates have an understanding of professional and ethical responsibility in professional practice.		X	
AAMU graduates have a recognition of the need for, and an ability to engage in life long learning.			X
AAMU graduates are competitive with other young professionals hired by my company.	X		
I would recommend that my company hire more graduates from Alabama A&M University, College of Engineering, Technology and Physical Sciences.	X	X	X

Appendix I – Assessment Activities (Exams)

1. CS Exit Examination Rubric

	Performance Indicators	Unsatisfactory (Unacceptable) (0)	Satisfactory (Acceptable) (1)	Above Satisfactory (Exceptional) (2)	Target
1	Ethics Related concepts	Most of the relevant ethics related concepts are missing	Sufficient relevant ethics related concepts are learnt (1-2 minor ones missing)	All relevant ethics related concepts are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
2	Concepts and Programming in C++	Most of the relevant C++ programming principles/concepts/ skills identified are missing	Sufficient relevant C++ programming principles/concepts/skills identified are learnt (1-2 minor ones missing)	All relevant C++ programming principles/concepts/ skills identified are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
3	Concepts and Programming in Java	Most of the relevant Java programming principles/concepts/ skills identified are missing	Sufficient relevant Java programming principles/concepts/skills identified are learnt (1-2 minor ones missing)	All relevant Java programming principles/concepts/ skills identified are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
4	Data Structure Concepts	Most of the relevant Data Structure principles/concepts/ skills identified are missing	Sufficient relevant Data Structure principles/concepts/skills identified are learnt (1-2 minor ones missing)	All relevant Data Structure principles/concepts/ skills identified are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
5	Theory and Concepts of Operating Systems	Most of the relevant Operating System principles/concepts/ skills identified are missing	Sufficient relevant Operating System principles/concepts/skills identified are learnt (1-2 minor ones missing)	All relevant Operating System principles/concepts/ skills identified are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
6	Database concepts and principles	Most of the relevant Database principles/concepts/ skills identified are missing	Sufficient relevant Database principles/concepts/skills identified are learnt (1-2 minor ones missing)	All relevant Database principles/concepts/ skills identified are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
7	Theory and Concepts of Algorithms	Most of the relevant theory and Concepts of Algorithms are missing	Sufficient relevant theory and Concepts of Algorithms are learnt (1-2 minor ones missing)	All relevant theory and Concepts of Algorithms are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
8	Software Engineering Principles	Most of the relevant Software Engineering principles/concepts/ skills identified are missing	Sufficient relevant Software Engineering principles/concepts/skills identified are learnt (1-2 minor ones missing)	All relevant Software Engineering principles/concepts/ skills identified are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
9	Theory and Concepts of Computer Organization	Most of the relevant theory and concepts of Computer Organization are missing	Sufficient theory and concepts of Computer Organization are learnt (1-2 minor ones missing)	All relevant theory and concepts of Computer Organization are learnt	70% of the students will show a performance of Level 1 (Satisfactory) or above (Above Satisfactory)
	Overall Performance	**Unsatisfactory (Unacceptable)**	**Satisfactory (Acceptable)**	**Above Satisfactory (Exceptional)**	**Satisfactory or Above Satisfactory**
	Percentage Points required	**(0-59)**	**(60-79)**	**(80-100)**	**(>=60)**

Exit Examination – Spring 2016 (Graduating Senior Students' Performance)



Positive Findings: Students' performance met the targets in Ethics, Data Structures.

Shortcomings: Students' performance did not meet the targets in C++, Java, Software Engineering, Operating Systems, Database, Algorithms and Computer Organization related skills.

Suggested Action(s) for the next cycle: Focus on 1) Computer Organization related skills with additional exercises/labs in CS 209, 381; 2) C++/Java Programming (CS 102, 109, 206); 3) Operating Systems (CS 384); 4) Database (CS 488); and 5) Algorithms (CS 425).

Major Field Test Rubric

Assessment Semester:

Performance Indicator	Unsatisfactory (Unacceptable) (0)	Satisfactory (Acceptable) (1)	Above Satisfactory (Exceptional) (2)	Target
Total Score in the MFT (Programming, Discrete Structures and Algorithms, Systems: Architecture/ Operating Systems/ Networking/ Database)	Most of the Programming, Discrete Structures and Algorithms, Systems (Architecture/ Operating Systems/ Networking/ Database) related skills are missing	Some of the Programming, Discrete Structures and Algorithms, Systems (Architecture/ Operating Systems/ Networking/ Database) related skills are learnt	Most of the Programming, Discrete Structures and Algorithms, Systems (Architecture/ Operating Systems/ Networking/ Database) related skills are learnt	70% of the graduating senior students who took the test will show a performance of Level 1 (total score >=133) or Above.
Overall Performance	**Unsatisfactory**	**Satisfactory**	**Satisfactory**	
Total Points Required	**120 - <133**	**133 – 165***	**165 - <=200**	

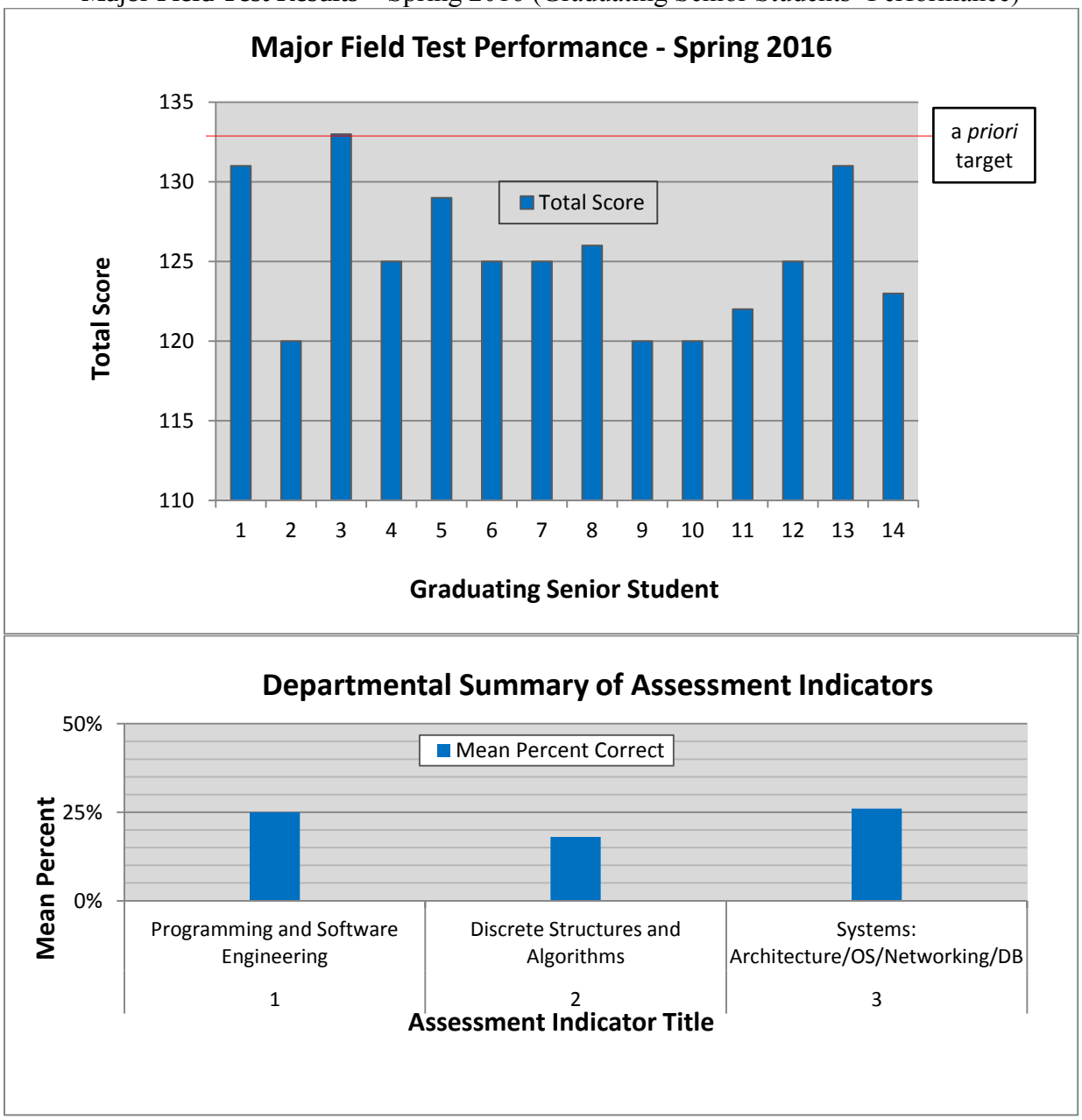
* Mean of 149.1 with a Standard Deviation of 16.1 (based on the ETS data from February 2006 to June 2011) was used to set the performance levels

Mapping of Computer Science Courses to Major Field Test (Spring 2016)

Assessment Semester: Spring 2016

Performance Indicators (Assessment Indicators)	Computer Science Required Courses
Programming and Software Engineering	CS 102, CS 109, CS 215, CS 401, CS 403
Discrete Structures and Algorithms	CS 203, CS 215, CS 425
Systems: Architecture/Operating Systems/Networking/Database	CS 209, CS 381, CS384, CS 488

Major Field Test Results – Spring 2016 (Graduating Senior Students' Performance)



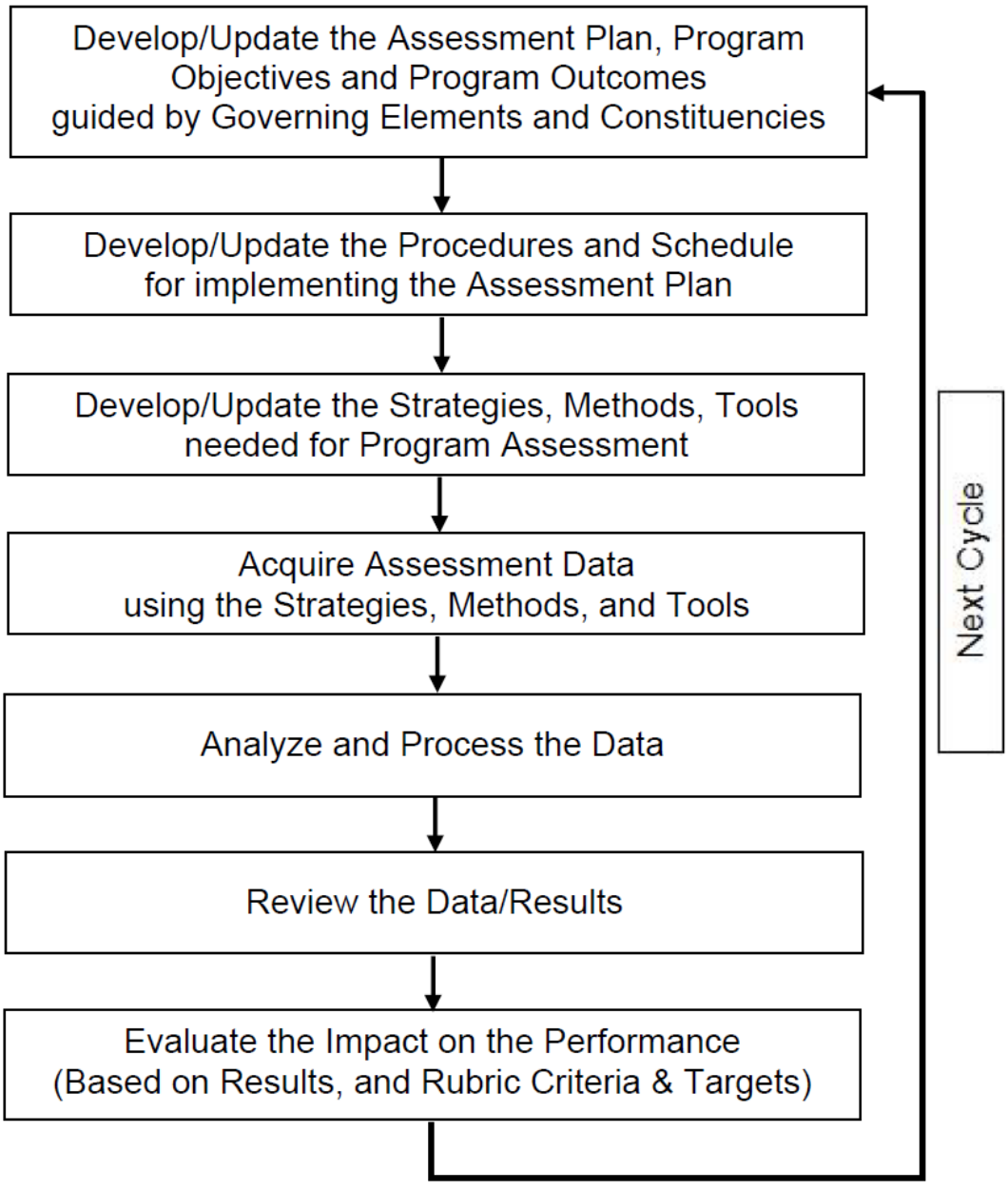
Positive Findings: 7 Percent of the students (1 out of 14) showed the target performance.

Shortcomings: The performance did not meet the set a priori target (70% student will have 133 or higher total score).

Suggested Action(s) for the next cycle: Focus on CS courses that are mapped to the MFT Performance Indicator skills of Programming, Discrete Structures and Algorithms, Systems: Architecture/Operating Systems/Networking/Database.

Appendix J-1 – Chart showing a summary of the Continuous Improvement Process

The Computer Science Program's **Continuous Improvement Process** includes the Assessment Approach that uses Data Sources (Stakeholders/Constituencies), Govern Elements, Assessment Tools and Data, Frequency Schedule of Data Acquisition and Assessment, Data Analysis, Data Review/Change implementation, Evaluation of Imp and Documentation process every step of the way.



Appendix J-2 – Program Outcomes mapped to Data and Data Origins

		Program Outcome Data Origin and Description	
S. No.	**Program Outcomes**	**Direct Measures**	**Indirect Measures**
1	Students will demonstrate critical knowledge, techniques, and tools of the discipline	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee
2	Ability to apply appropriate and emerging mathematics, science, and engineering technologies to solve problems	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee
3	Demonstrate a willingness to work with and as team members	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee, Peer-Evaluation by Team Members, Instructor Evaluation of Team Projects
4	Have documented abilities for writing and presentation skills	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee

5	Demonstrate and apply one or more modern computer languages to problem solving	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee
6	Clearly express the basis for responsible and ethical behavior in their profession and recognize the need for it	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee, Response from Industry on Student Interns
7	Show an understanding to concepts in software engineering, operating systems, computer architecture, and algorithm analysis	Exams/test/quizzes, Homework, including programming, assignments, Term papers, Semester projects, Senior Design Projects, Oral presentations, Exit Examination	Student Satisfaction Survey, Student Course Evaluation, Graduating Senior Survey, Feedback from the industry advisory board, Post-semester course survey by faculty, Course-level Student Learning outcome Assessment by faculty, Program-level Student Learning outcome Assessment by faculty/committee

Appendix J-3 - Program Educational Objectives mapped to Data and Data Origins

		Program Educational Objectives Data Origin and Description
S. No.	**Program Educational Objectives**	
a	They will work in careers in computing and associated technology fields.	Alumni Survey, Employer Survey
b	They will practice their professional endeavors, communicating effectively, as team members, in leadership positions to the highest legal and ethical standards.	Alumni Survey, Employer Survey
c	They will realize, mentor, and pursue a program of continuous educational improvement for the benefit of themselves and others in our dynamic and rapidly changing field.	Alumni Survey, Employer Survey

Appendix K – Faculty Vitae

Name

Venkata Atluri

Education

Degree	Discipline	Institution	Year
MS	Computer Science	Alabama A&M University	1998
MS	Food Science	Alabama A&M University	1997
Ph.D.	Zoology	Nagarjuna University	1986

Academic Experience

2004 - present – Associate Professor, Computer Science, Alabama A&M University, Normal, AL
2011 – 2012 – Coordinator, Computer Science, Alabama A&M University, Normal, AL
2011 – 2011 – interim Chair, Computer Science, Alabama A&M University, Normal, AL
2007 - 2009 – interim Chair, Computer Science, Alabama A&M University, Normal, AL
1998 - 2004 – Assistant Professor, Computer Science, Alabama A&M University, Normal, AL
1998 – 1998 – Software Engineer, Integrated Informatics Inc., Atlanta, GA
1997 - 1998 – Graduate Assistant, Computer Science, Alabama A&M University, Normal, AL
1989 - 1989 – Visiting Scientist, The University, Southampton, England

Non-academic Experience

Certifications or Professional Registrations

Current Membership in Professional Organizations

Senior Member, IEEE (Institute of Electrical and Electronics Engineers)
Member, ACM (Association for Computing Machinery)

Honors and Awards

Outstanding Performance Recognition form Lockheed Martin, Inc., FL, 2010
Outstanding Service Award for 2003 from IEEE (Institute Of Electrical and Electronics Engineers)
Teacher of the Year Award - from the Dept. of Computer Science Club, 2002
Award of Support to the Department of Computer Science Club, 2002

Service Activities (within and outside of the institution)

Participates in the Committees at the Department, College, and University Level
Attends the meetings of the local IEEE, ACM and other Professional Organizations

Most important publications and presentations from the last five years

Recent Professional Development Activities

- A showcase of Emerging tools for advanced Threat Intelligence and investigative needs, Friday, March 11, 2016, 12:30-1:30pm, A "Tech Power Hour" presentation, Main Conference Room, 655 Discovery Dr., Huntsville, AL 35806.
- Implementing the Cybersecurity Framework webinar on February 24, 2015 at 1:00 pm ET by Dr. James Angle, National Cybersecurity Institute
- CETL Workshop on "Introduction to evidence-based teaching" Thursday Janaury 28, 2016 12:30-2:00 pm

- Degree Works training on Thursday, January 14, 2016 at 12:30 pm in the Arthur J. Bond (ETB) Auditorium Room 233

Name

Alak Bandyopadhyay

Education

Degree	Discipline	Institution	Year
Ph.D.	Mechanical Engineering (CFD)	University of Minnesota, Minneapolis	1993
M.S.	Mechanical Engineering	Indian Institute of Technology, Kanpur	1987
B.S.	Mechanical Engineering	National Institute of Technology, Durgapur	1985
24 Credits (Grad)	Computer Science	Syracuse U and A&M	

Academic Experience

- Alabama A & M University, Associate Professor, Computer Science, 2009 – present
- Alabama A & M University, Assistant Professor, Computer Science, Fall 2004-2009
- Univ. of Alabama, Birmingham, Visiting Professor, Mechanical Engineering, Spring 2004-Summer 2004
- Univ. of Alabama, Huntsville, adjunct Professor, Mechanical Engineering, 2005-2006
- State Univ. of New York, Syracuse, Senior Research Scientist, 1997-2001, Paper Science and Engg.

Non-academic Experience

- Application Engineer, CFD Research Corporation, Huntsville, 2001-2004
- Senior Scientist/Engineer, Indian Space Research Organization, Trivandrum, 1994-1997
- Fellow, National Aerospace Laboratories, Bangalore, India, 1993-1994

Certifications or Professional Registrations

Current Membership in Professional Organizations

- Member, ACM Computer Society
- Member, IEEE
- Member, AIAA
- Member, Alabama Academy of Science

Honors and Awards

- Best Faculty Service Award, 2015, in College of Engineering, Tech. and Physical Sciences
- Faculty Fellowship from NASA, MSFC, 2006, 2007, 2010, 2012, 2014, 2015
- ESMD Faculty Fellowship from NASA Education, 2009-2010
- Gold Medalist for topping in BS in Mechanical Engineering from National Institute of Technology, 1985
- Best Project award for senior Project (BS) and AM DAS memorial award, 1984

Service Activities (within and outside of the institution)

- Undergraduate Advisor to about 25 students and Graduate Advisor to about 10

students

- Thesis advisor to 4 graduate students
- Member, graduate Thesis Examination committee to 5 other students
- Chair faculty search committee, 2014 to present
- Chair, MS comprehensive examination
- Member, Computer Science Graduate Committee, curriculum committee, text book committee, and retention committee
- Member, special appointment from Human Resource, Alabama A & M, Faculty Grievance Screening Committee
- Mentor to Graduate Independent Research to 6 students since Fall 2015.
- Department of Computer Science Representative to University standards committee.

Most important publications and presentations from the last five years

1. A.Batra, A. Almori, A. Chilvery, A. Bandyopadhyay, and K. Grover, "Piezo-electric Power Harvesting Devices: An Overview", J. Adv. Science, Engineering and Medicine, vol. 8, pp 1-12, 2016.
2. Alak Bandyopadhyay and Alok Majumdar, "Network Flow Simulation of Fluid Transients in Rocket Propulsion Systems", AIAA, Journal of Propulsion and Power, vol. 30, no. 6, pp 1646-1653, 2014.
3. A. Ghosh, M.S.Janaki, B.Dasgupta, and A.Bandyopadhyay, "Chaotic Magnetic Field in Vlasov-Maxwell Equilibria", J. of Chaos, American Inst. Of Physics, vol. 24, 2014
4. A.K.Batra, Alak Bandyopadhyay, Ashwith Chilvery, Mychal Thomas, "Modeling and Simulation for PVDF-based Pyroelectric Energy Harvester", J. Energy Sc. And Tech, vol. 5, no. 2, 2013, pp1-7
5. A. Batra, A. Almori, M. Aggarrwal and A. Bandyopadhyay, "Energy Harvesting under Excitation of Clamped-Clamped Beam", Proc. SPIE 9806, Smart Materials and Nondestructive Evaluation for Energy Systems 2016, 980612 (April 1, 2016); doi:10.1117/12.2217701

Recent Professional Development Activities

- Attended workshop on "How to adopt Evidence Based Teaching in your courses to improve active learning", Center for Distance Education and eLearning, Alabama A & M University, 4 sessions, March 2016.
- Attended workshop on "Sixth Workshop on Integrating Software Testing into Programming Courses", Florida International University, Miami, June 2015

Name

Nelson Barnes

Education

Degree	Discipline	Institution	Year
Ph.D.	Management Information Systems	The University of Alabama	2018
M.S.	Computer Engineering/Software Engineering	The University of Alabama in Huntsville	2002
B.S.	Industrial Engineering	New Mexico St. University	1997

Academic Experience

- Assistant Professor, Alabama A&M University (2005-Present)
- Adjunct Professor, J. F. Drake State (2006 - Present)

Non-academic Experience

- VP/CIO, Triumvirate Consulting Inc., Huntsville, AL (1997 – Present)
- Subject Matter Expert, Global Solutions International, Atlanta, GA (2002 – Present)
- Senior Software Consultant, Engenius, Atlanta, GA (2010 – 2012)
- Senior Staff Software Consultant, General Dynamics, Phoenix, AZ (2003–2006; 2009–2010)
- Senior Software Consultant, BAE Systems, Huntsville, AL (2009 – 2010)

Certifications or Professional Registrations

Current Membership in Professional Organizations

- Member, IEEE (Institute of Electrical and Electronics Engineers) (since 1997)
- Member, ACM (Association for Computing Machinery) (since 1997)
- Member, AIS (Association for Information Systems) (since 2006)

Honors and Awards

1. Teacher of the Year Award - Dept. of Computer Science Club, 2006
2. Researcher of the Year Award – AAMURI 2009

Service Activities (within and outside of the institution)

1. Chair, Recruitment and Retention Committee, 2008-Present
2. Member, Curriculum Committee, 2008-Present
3. Member, Dept. Exit Exam Committee, 2010-Present
4. Member, Academic Standards & Curriculum Committee 20010-2011
5. Faculty Senator, 2010 -2012
6. Advisor, Department Computer Science Club 2007-2009
7. Member, Faculty Search Committee, 2011
8. Member, Budget and Planning Committee, 2010
9. Member, NCAA Review Team, 2005

Most important publications and presentations from the last five years

1. "The Development of Smart Software for Mobile Device Development", G. Ball, N. Barnes and D. Taylor, US Air Force White Paper (2013).
2. "Integrating Software Testing into Computer Science Curriculum Using WReSTT

Cycle", Y. Fu, N. Barnes (2016).

Recent Professional Development Activities

- Special Consultant to the Vice President, Boeing - Huntsville Business Operations (2007)
- Consultant, Web Service Design and Development for Knowledge-Based Systems for MDA (2008-2009)
- Consultant, Records Management System Study and Analysis with SSI and USCOE (2010)
- Consultant, Web Service Design and Development for Real Estate System for USCOE (2011)
- Consultant, Business System Integration for AT&T, with GSI (2012)
- Senior Software Consultant for STS and USCOE (2012 – present)

Name

Willie Bossie

Education

Degree	Discipline	Institution	Year
BS	EET	Alabama A&M University	1979
MS	Computer Science	Alabama A&M University	2000

Academic Experience

Lab Coordinator 2000-2003 - Alabama A&M University
Assistant Professor Computer Science 2003-Present - Alabama A&M University

Non-academic Experience

- Hewlett Packard customer field service engineer (13 years). Installation, configuration and repair of mini and personal computers and related peripheral devices and software.
- Bethco Inc. customer field service engineer (1 year). Installation, configuration and repair of PC equipment, Novell networks, related peripheral devices and software.
- Hewlett Packard, IBM and Compaq factory computer hardware trained.

Certifications or Professional Registrations

A+ Certified Computer Technician.

Current Membership in Professional Organizations

National Education Association (NEA)
Alabama Education Association (AEA)
Association for Computing Machinery (ACM)

Honors and Awards

Certificate of Appreciation, Alabama A&M University Computer Science Club, December 1, 2004.
Certificate of Appreciation, Alabama A&M University LSAMP Bridge Program, June 7, 2004.
Certificate of Appreciation, Eta Kappa Tau Engineering and Technology Fraternity, Alpha Chapter, April 2, 2004.
Certificate of Appreciation, 2004 Black Engineer of the Year Awards Conference, February 21, 2004.

Service Activities (within and outside of the institution)

Scholarship Committee (School).
Curriculum Committee (Department)
Textbook Committee (Department)

Most important publications and presentations from the last five years

Recent Professional Development Activities

- Summer 2010. Michael P. Anderson Summer Outreach Program 2010. Alabama A&M University. Electronic Subject Matter Expert.
- Summer 2011. Michael P. Anderson Summer Outreach Program 2011. Alabama A&M University. Computer Hardware Subject Matter Expert.
- Partners for Innovation in Information Technology (PIIT) Summer Camp 2011. Alabama A&M University. Alice Graphics Programming Instructor.

Name

Jian Fu

Education

Degree	Discipline	Institution	Year
Ph.D.	Computer Science and Engineering	University of Alabama in Huntsville	2005
M.S.	Computer Science	Alabama A & M University	1998
M.S.	Physics	Alabama A & M University	1996
B.S.	Physics	Anhui Normal University	1983

Academic Experience

- Assistant/Associate/Full Professor – Department of Computer Science, Alabama A & M University, Normal, Alabama, 2003-present
- Assistant Professor – Department of Math and Computer Science, University of North Alabama, Florence, Alabama, 2002
- Assistant Professor – Department of Scientific and Technological Information, University of Science and Technology of China, 1989-1992

Non-academic Experience

- Software Engineer - MESA Solutions, Inc., Huntsville, Alabama, 1999 – 2001
- Software Consultant - Intergraph, Huntsville, Alabama, 1998 – 1999
- Software Engineer – Rackley Systems, Pulaski, Tennessee, 1997 - 1998

Certifications or Professional Registrations

None

Current Membership in Professional Organizations

Senior Member, IEEE

Honors and Awards

- "Hyperspectral Image Analysis using Artificial Color" is listed as the most widely read articles in SPIE digital library: Top ONE in remote sensing and in top 10 over all fields, 2010.
- Jim Zimmerman Award, AAMURI, 2008.
- Research on Modular Solid Optical Time Delay System has been awarded SPIE Milestones, 1997.

Service Activities (within and outside of the institution)

- Chair, the Engineering School Tenure and Promotion Committee, 2010, 2011
- Faculty Senator, Alabama A & M University, 2009
- Graduate Coordinator, Dept. of Computer Science, AAMU, 2007-2011

Most important publications and presentations from the last five years

- Y. Wang, J. Fu, R. Adhami and H. Dihn. "A novel learning-based switching median filter for suppression of impulse noise in highly corrupted colour images," The Imaging Science J., 64(1), 15-25, (2016)
- Y. Wang, R. Adhmai, J. Fu, and H. AI-Ghaib. "A novel supervised learning algorithm for salt-and-pepper noise detection," Int. J. Mach. Learning and Cybernetics, 6(4), 687-697 (2015)

- J. Fu, H. J. Caulfield, and C. Glenn. “Primitive attempt to turn images into percepts,” Int. J. Mach. Learning & Cybernetics, 5(6), 963-970 (2014)

Recent Professional Development Activities

- ABET Symposium 2016, Fort Lauderdale, FL, United States
- SPIE/IS&T Electronic Imaging 2015, San Francisco, CA, United States
- ABET Symposium 2015, Atlanta, GA, United States

Name

Yujian Fu

Education

Degree	Discipline	Institution	Year
Ph.D.	Computer & Info Science	Florida International University	2007
M.S.	Electrical Science	Nan Kai University	1997
B.S.	Physical Science	Tangshan Normal University	1992

Academic Experience

Assistant Professor 2007 – 2012 Alabama A&M University, Normal, AL, USA
Associate Professor 2012 – present Alabama A&M University, Normal, AL, USA

Non-academic Experience

Certifications or Professional Registrations

Online Teaching and Education Workshop.

Current Membership in Professional Organizations

IEEE, ACM, ASEE,

Honors and Awards

Service Activities (within and outside of the institution)

Reviewer of IEEE Transaction of Software Engineering
Reviewer of IEEE International Conferences (HASE'14,15, and Southeast Conf 14 and 16)
Program committee of HASE'14 and 15
NSF Panel Reviewer of a couple of program

Most important publications and presentations from the last five years

1. Yujian Fu and S. Drager. Reconfiguration of Autonomous Robotics. Special Issue on architectural Design of Advanced Swarm Robotics Systems, Part 2, International Journal of Robotics Applications and Technologies (IJRAT). Vol 3, No 1. pp 41 – 58. 2015.
2. Z. Dong and Yujian Fu. Runtime Verification Robotics. Special Issue on architectural Design of Advanced Swarm Robotics Systems, Part 2, International Journal of Robotics Applications and Technologies (IJRAT). Vol 3, No 1. pp 41 – 58. 2014.
3. H. Ayala and Yujian Fu. Design and Implementation of BIOLOID Humanoid Robot. Special Issue on architectural Design of Advanced Swarm Robotics Systems, Part 2, International Journal of Robotics Applications and Technologies (IJRAT). Vol 2, No 2. pp 78 – 93. 2014.
4. W. Choosilp, Yujian Fu. A Case Study Of Malware Detection and Removal in Android Apps. International Journal of Mobile Network Communications & Telematics, Vol. 4, No. 4, April 2014.
5. Yujian Fu, W. Choosilp. Testing of SMS Security Properties on Android Systems. International Journal of Mobile and Wireless Communications, 2014.
6. Yujian Fu, L. Yan, J. Kulick, S. Drager. Formal Modeling and Verification of Security Properties of Handel C Programs. International Journal of Secure Software

Engineering, 2012
Recent Professional Development Activities
• Mini-Workshop of Applying Software testing in programming courses, Oct 23 -24, 2015, Miami, FL. • Workshop of Mobile Security, June 30, 2015, Tuskegee, AL. • Workshop on Integrating Software Testing into programming courses, June 12-13, 2015, Miami, FL. • Workshop on Integrating Software Testing into programming courses, June 18-19, 2014, Miami, FL. • Workshop of Multi University Research and Training in Protection of Critical Information Infrastructures, Jun 5-16, 2012, Miami, FL.

Name

Jay R. Gangasani

Education

Degree	Discipline	Institution	Year
BS	Agriculture Sciences	P.R. University	June, 1980
MS	Computer Science	Jackson State	May, 1988
PhD	NRES	Alabama A&M University	Dec, 2016

Academic Experience

Computer Science Instructor (08/01 to Present) Alabama A&M University
College teaching of High Performance Computing (CMP490), C++ (CMP 102 & CMP 109), Oracle , Access (CMP 488L) Software Packages (CMP 101), Introduction to Computers & Ethics (CMP 104), Computers in Society (CMP 330) , Introduction to Web Programming (CMP 304), at all levels of undergraduate Computer Science courses including Database Management Systems (CMP 488L), Operating Systems (CMP 384) and Computer Organization (CMP380). Also responsible for advising students, chair of curriculum committee. As computer Labs coordinator, the responsibilities includes setting up servers in Windows 2003, Oracle and LINUX systems, systems administration, networking computer labs, setup faculty computers, managing graduate assistants for computer labs, ordering computer inventory, software, hardware including desktops and laptops and overall maintenance of all Computer Science Departments Computers.

Non-academic Experience

The following are some of my recent short term consulting experiences:

- Intergraph Inc: **Consultant (05/10/14 – 07/25/14)**

Provided portal-based integration solutions with focus on Web content management, enterprise content management, imaging, document management and digital media.

- Intergraph Inc: **Consultant (04/15/13 – 08/10/13)**

Designed and developed a virtual cluster monitoring (VCM) platform for an integrated suite of tools for monitoring and managing the geographically distributed infrastructure in the Graphics division. This out of the box web-based tool suite provided an easy way to manage complex applications. It also provides an alternative and intuitive way to accomplish a very complex task of network, applications and database monitoring and management.

Certifications or Professional Registrations

Current Membership in Professional Organizations

Association for Computing Machinery (ACM)
Institute of Electrical and Electronic Engineers (IEEE)
Association for Information Systems (AIS)
HUNTUG- Huntsville professional organization
Alabama Education Association (AEA)
National Education Association (NEA)
Parent Teacher Association (PTA)

Honors and Awards

- Award of Appreciation from **Chair, Alabama Academy of Science (AAS) Local Arrangement Committee**, Dr. Yong Wang and **Co-Chair, AAS Local Arrangement**

Committee, Dr.Phil Bording for contributing my services to the Local Arrangements Committee of Alabama Academy of Science for the 87th Annual Conference of the Alabama Academy of Sciences held at Alabama A&M University in April, 2010.

- Award of Appreciation from **Chair, Computer Science Department**, Alabama A&M University for Installing Computer Network Servers, Hardware and Software in Computer Science Departmental Labs and Faculty Computers, 2006 – 2007.
- Award of Appreciation from **FAA , SE Regional Office** for Completing Y2K Projects ahead of schedule, March 2000.

Service Activities (within and outside of the institution)

- Supporter of Downtown Rescue, Huntsville, AL – 2006 - Present
- Supporter, Children's International Organization, 1996 – Present, Adopted 2 children, One child from Philippines and another from Ecuador, correspondence and evidence is enclosed In the Service to the Public section of the Promotion Folder.
- Supporter of OPERATION SMILE, 2006 – Present
- Supporter for American Diabetes Association, 2006 – present.
- Supporter for MADD – Mothers Against Drinking and Driving, 2007 – Present.
- Supporter for a LEG TO STAND ON, 2006 – Present.

Most important publications and presentations from the last five years

"Artificial Color Estimation of Temperatures" by Jayachander R. Gangasani, Jian Fu, and H. John Caulfield. Paper ID #: CGV2535, the 16th International Conference on Computer Graphics and Virtual Reality (CGVR'12: July 16-19, 2012, USA) has been accepted for publication in the conference proceedings/books and presentation.

Recent Professional Development Activities

PhD Degree: Pursuing PhD degree, completed course work, working on dissertation research. Expecting to complete in December 2016.

Name

Muhammad Ghanbari

Education

Degree	Discipline	Institution	Year
BS	Mathematic	University of TABRIZ, IRAN	1968
MS	Computer Science	Central Michigan Uni.	1993
PhD	Computer Eng.	University of Alabama	1997

Academic Experience

- I have been teaching in computer science dept. since 1977 and taught all courses in computer science dept. graduate and under.
- I have taught all programming courses since 1977. Undergraduate since 1977-1985, Graduate 1985-present.

Non-academic Experience

Worked for NASA 1990-1993 in graphics and image processing on remote sensing and Helicopter remote control..

Certifications or Professional Registrations

I got certification from ORACLE in 1995 and I have worked on oracle since 1977.

Current Membership in Professional Organizations

Association for Computing Machinery (ACM) since 1979

Honors and Awards

Service Activities (within and outside of the institution)

1977-1983: University of Tennessee, Knoxville Instructor.
1983-1985: Tuskegee University, Computer science dept.
1985-1990: A&M Computer science dept.
1990-1993: Worked for NASA and Got my PhD from UAH.
1994-1997 University of Tehran, IRAN computer science dept.
1997-2001: Ajman University, UAE, associate dean of computer Eng. College
2001—present: Alabama A&M, computer science dept.

Most important publications and presentations from the last five years

I wrote a book in database management system in IRAN which was published in 1996 in IRAN.
I wrote C++ text book published here in USA 2011.

Recent Professional Development Activities

Working in the area of cryptography and Quantum Computer.

Name

Terry Miller

Education

Degree	Discipline	Institution	Year
M.S.	Computer Science	Alabama A&M University	2002
B.S.	Computer Science	Alabama A& University	2000

Academic Experience

Alabama A&M University - Normal, AL
Instructor-Department of Computer Science, 2015-present (full-time)
Adjunct-Department of Computer Science, 2012-2015 (part-time)
Executive Assistant-Office of Academic Affairs, 2010-2015 (full-time)

Non-academic Experience

IBM-Almaden Research Center (ARC) - San Jose, CA
Technical Intern, 6/2003-8/2003 (full-time) - Installation of the IBM TotalStorage SAN File System, using a Linux Operating System kernel and the Python scripting language.

Certifications or Professional Registrations

Current Membership in Professional Organizations

Association for Computing Machinery (ACM)
Society of Women Engineering (SWE)
Institute of Electrical and Electronics Engineers (IEEE)
National Society of Black Engineers (NSBE)
American Association of University Professors (AAUP)

Honors and Awards

2002 GEM Fellow

Service Activities (within and outside of the institution)

Departmental Academic Standards and Curriculum Committee
International Recruitment Committee
Student Judiciary and Hearing Committee
Fulbright Scholar Campus Liaison

Most important publications and presentations from the last five years

Recent Professional Development Activities

Current doctoral student at the University of Alabama in Huntsville

Name

Xiang Zhao

Education

Degree	Discipline	Institution	Year
Ph.D.	Computer Science	University of Alabama in Huntsville, US	2005
M.S.	Computer Science & Engineering	University of New South Wales, Australia	2001
B.S. & M.S.	Mechanical Engineering and Automation	Beijing University of Aeronautics and Astronautics, China	1989, 1992

Academic Experience

Alabama A&M University, Associate Professor, 2011-present, full time
Alabama A&M University, Assistant Professor, 2007-2011, full time
Athens State University, Assistant Professor, 2005-2007, full time

Non-academic Experience

China Aviation Industry Corporation (CAIC), Engineer and Division Director, 1992-1997, full time

Certifications or Professional Registrations

Current Membership in Professional Organizations

- Association for Computing Machinery (ACM)
- Society of American Military Engineers (SAME)
- American Society of Engineering Education (ASEE)
- Alabama Education Association (AEA) and National Education Association (NEA)

Honors and Awards

- Society of American Military Engineers (SAME) National Distinguished Chapter Award, 2013-2015
- NASA Exploration Space Grant Summer Faculty Fellowship, 2012

Service Activities (within and outside of the institution)

- Faculty Advisor for Society of American Military Engineer (SAME) AAMU Student Chapter, 2012-present
- University tenure and promotion procedure committee, 2015-present
- Program coordinator, Massie Chairs of Excellence Summer Outreach Program, Sponsored by Department of Energy/NNSA, 2011-2013
- Chair of the CS Department Search Committee, 2012-2013
- Department Graduate Committee, 2011-present
- Graduate thesis committee chair/member, 2007-present
- College of Engineering, Technology, and Physical Sciences Promotion & Tenure Committee, 2013- 2015
- University STEM Day Committee, 2011-2014
- Computer Science Graduate Faculty and Advisor, AAMU, 2007-present
- Computer Science Senior Exit Exam and Graduate Comprehensive Exam Committee, 2007-present

- Proposal Reviewer, Department of Energy Nuclear Energy University Program (NEUP)
- Judge, Alabama Science and Engineering Fair
- Reviewer, American Society of Engineering Education Annual Conference
- Session Chair, 2013 21st International Conference on Nuclear Engineering
- Editorial Board Member, Journal of Information Engineering (IE)

Most important publications and presentations from the last five years

1. **Zhao, X.**, Meganathan, A., Zhang, S., 2015, A Computational Approach for Aero-Heatingwith Thermal Coupled Fields, AIAA Journal of Thermophysics and Heat Transfer, Accessed August 12, 2015, http://arc.aiaa.org/doi/abs/10.2514/1.T4633
2. **Zhao, X.**, Glenn, C., Xiao, Z., Zhang, S.J., 2014, CFD Development For Macro Particle Simulations, International Journal of Computational Fluid Dynamics, DOI: 10.1080/10618562.2014.924621, Taylor & Francis
3. **Zhao, X.**, Bayyuk, S., and Zhang, S. J., 2013, Aeroelastic Response of Rocket Nozzles to Asymmetric Thrust Loading, Computers and Fluids, vol. 76, 128-148, 2013 (dx.doi.org/10.1016/j.compfluid.2013.01.022)
4. **Zhao, X.** and Zhang, S. J., 2012, Transonic Wing Flutter Predictions by a Loosely-Coupled Method, Computers and Fluids, vol. 58, 45-62, 2012 (doi:10.1016/j.compfluid.2012.01.002)
5. **Zhao, X.**, Montgomery, T., and Zhang, S. J., 2011, Gas Flow Simulations in Randomly Distributed Pebbles, ASME Journal of Engineering for Gas Turbines and Power, Vol. 133(5), 052913, 2011 (doi:10.1115/1.4002833).
6. **Zhao, X.**, Majid, F., Montgomery, T., Glenn, C., Stewart, J., 2015, "Effectuating Evidence based Transformative Pedagogical Approaches in STEM Foundational Courses—A Pilot Study", Proceeding of 2015 ASEE Annual Conference and Exposition, June 14-17, Seattle, WA.
7. **Zhao, X.**, Montgomery, T. and S. Zhang, 2013, "Computational Study On A Single Flow Element In A Nuclear Thermal Rocket", 2013 21st International Conference on Nuclear Engineering, July 29-August 3, 2013, Chengdu, China, ICONE-15683

Recent Professional Development Activities

- 2016 ASEE-SE Annual Conference, March 13-14, 2016, Tuscaloosa, AL
- CETL Evidence-Based Teaching Workshops, Jan.-Mar., 2016, AAMU, AL
- 2015 ASEE Annual Conference and Exposition, June 14-17, 2015, Seattle, WA
- 2014 Frontiers of Engineering Education (FOEE), October 26-19, 2014, Irvine, CA
- 20th International Conference on Nuclear Engineering and 2012 ASME Power Conference, July 30-August 3, 2012, Anaheim, CA

Name

Albanie Tremaine Bolton

Education

Degree	Discipline	Institution	Year
Ph.D.	Computer Science	Auburn University	2014
M.S.	Computer Science	Auburn University	2010
B.S.	Computer Science	Alcorn State University	2008

Academic Experience

- January 2012 – Present: **Adjunct Professor (part time), Alabama A&M University, Huntsville, AL** Delegations: **Spring 2016**: Undergraduate Level Fundamentals of Computer and Information Systems; This course is designed to introduce students to fundamentals of computer science and technologies.
- **Fall 2014, Fall 2015**: *Undergraduate Level Introduction to Database*; This course is geared towards students who are interested in the use of the operating system and other software systems is the core content of this course.
- **Spring 2014, Spring 2015**: *Undergraduate Level Linux with Application Programming*; This course is geared towards students who are interested in administering, using, or developing programs for the Linux operating system.
- Spring 2013: *Graduate Level Neural Network course*; Neural networks provide a model of computation drastically different from traditional computers.
- Spring 2012: *Graduate level Application of Statistical Methods course*; Course is intended for learning basic and advanced areas of applied statistics and probability using a generalized software R.
- August 2011 – December 2011: **Graduate Teaching Assistant (GTA), Auburn University, Auburn, AL** Delegations.

Non-academic Experience

- May 2009 – Present: **AST, Data Systems and Analysis Engineer (full time), NASA, Huntsville, AL.**
- December 2015 – Present: **AST, Software Systems Test & Verification Engineer**
- January 2013 – June 2015: **AST, Flight Software Tools Team Lead**
- June 2015 – December 2015 **EV74 System Analysis Branch (System Engineer)**
- May 2009 – December 2010: **Test/Design Engineer**

Certifications or Professional Registrations

- *NextProf 2012 Cohort (9/21/2012)*
- *Preparing Future Faculty Cohort/Graduate (4/19/2012)*
- *CITI Training Certified*
- *Granted Government Clearance*

Current Membership in Professional Organizations

- NASA Ambassador Cohort (2010 – Present)
- Society of Women Engineers (SWE)
- Alpha Kappa Alpha Sorority, Inc. (Rho Chi Omega, Huntsville Chapter)
- Alpha Kappa Mu Honor Society
- S.T.A.R.S Alliance
- Black Graduate Professional Student Association (B.G.P.S.A)

- National Association for the Advancement of Colored People (NAACP)
- National Society of Black Engineers (NSBE)

Honors and Awards

- MSFC Director's Commendation Honor Award 2014
- CRA-Graduate Cohort Scholarship Recipient (2013, Unable to attend)
- Tapia Scholarship Recipient, Fall 2013
- Grace Hopper Women in Computing (GHC) Scholarship Recipient 2012 (unable to attend)
- Grace Hopper Women in Computing (GHC) Scholarship Recipient 2011
- Human Computer Interaction (HCI) International Nominee, Spring 2011

Service Activities (within and outside of the institution)

- Alpha Kappa Alpha Sorority, Little Dresses for Africa Project
- A.S.C.E.N.D STEM Workshops (9-12th grade)
- Childhood Hunger Drive
- Seasonal Wrap Drive
- Manna House Volunteer
- Salvation Army Volunteer
- HBCU College/Career Day
- Angel Pageant (4 years old – 8th grade)

Most important publications and presentations from the last five years

- Bolton, A.T., Seals, C.D. (2013). Social Networking and Culturally Situated Design Teaching Tools: Providing a Collaborative Environment for K-12, HCI International 2013 Conference on Human-Computer Interaction.
- Bolton, A. T., Seals, C. D. (2011). Culturally Situated Design Tools: Animated Support Tools for Mathematics. HCI International 2011 Conference on Human-Computer Interaction, HCI (16) 2011, pp. 351-359.
- Bolton, A. (2014) Social Networking and Culturally Situated Design Teaching Tools: Providing a Collaborative Environment for K-12, HCI International 2013 Conference on Human-Computer Interaction. Auburn University
- Bolton, A., Johnson, J., Reid, C., Wright, L. & Seals, C. (2014). "Culturally Situated Design Tools: Animated Support Tools for Abstraction. *Richard Tapia Celebration of Diversity in Computing 2014*
- Bolton, A., Nyagwencha, J., Seals, C. (2011). "Virtual Education Communities Supported with Cloud Computing" *STARS Celebration 2011*, Raleigh, NC, USA.
- Bolton, A., Seals, C. (2011). "Culturally Situated Design Tools: Animated Support Tools for Mathematics". *HCI International 2011*, Tampa, FL, USA.
- Bolton, A., Seals, C. (2011). "Culturally Situated Design Tools: Animated Support Tools for Mathematics". *Richard Tapia Celebration of Diversity in Computing 2011*

Recent Professional Development Activities

- Attended workshop on "How to adopt Evidence Based Teaching in your courses to improve active learning", Center for Distance Education and eLearning, Alabama A & M University, 4 sessions, March 2016.
- Attended workshop on "Sixth Workshop on Integrating Software Testing into Programming Courses", Florida International University, Miami, June 2015

Name

Julius Jow

Education

Degree	Discipline	Institution	Year
Ph.D.	Computer Science	University of Alabama	2016 (Expected)
M.S.	Computer Science	Auburn University	2010
B.S.	Computer Science	Alcorn State University	2008

Academic Experience

2005 – Present: Instructor- Alabama A&M University, Normal, Alabama.
2013 – 2015 Summer: Assistant Professor of Research- Alabama A&M University, Normal, Alabama.
2012 – 2013: Graduate Research Assistant - The University of Alabama, Tuscaloosa, Alabama.
2010 – Summer: Research Associate - National Academy of Engineering, Washington DC.
2003 – 2004: Graduate Teaching Assistant- Alabama A&M University Normal, Alabama.

Non-academic Experience

1999 – 2001: Customer Support Engineer -The Document Company Xerox, Nairobi, Kenya

Certifications or Professional Registrations

A+, Security +, Network +

Current Membership in Professional Organizations

IEEE, ACM, INCREASE ONLINE, NATIONAL INSTRUMENTS USERS GROUP

Honors and Awards

Upsilon Pi Epsilon
Community Service Award, AAMU, 2009
Upsilon Pi Epsilon

Service Activities (within and outside of the institution)

Cyber Security Lab Development, AAMU, 2015
Volunteer Basketball Coach, Meridianville Athletic Association, Boys U14, 2015-2016
Volunteer Basketball Assistant Coach, South East, YMCA, Boys U12, 2015-2016

Most important publications and presentations from the last five years

- Reliability Analysis of Intrusion Detection and Protection Systems in Neighborhood Area Networks of SmartGrids, NYSETA, Rochester Institute of Technology, New York, Oct 2015 (Presentation)
- S. U. Egarievwe, R. B. James, **J. O. Jow**, M. E. Edwards, N. D. Blackburn, V. T. Montgomery, and C. M. Glenn. "Integrative Curriculum Development in Nuclear Education and Research Vertical Enhancement Program." Advancements in Nuclear Instrumentation Measurement Methods and their Applications Conference, Lisbon, Portugal, 20-24 April 2015, Paper # 294.
- S. U. Egarievwe, U. N. Roy, D. K. Kithinji, **J. O. Jow**, J. O. Mwathi, Ge Yang, and Ralph B James, "Study of post-growth annealing of CdMnTe X-ray and gamma-ray detectors in Cd-rich atmosphere," Accepted for SPIE Optics & Optoelectronics 2015, Prague, Czech Republic, 13-16 April, 2015, Paper # 9504-15.

- S. U. Egarievwe, A. Hossain, **J. O. Jow**, U. N. Roy, and Ralph B James, "Comparative study of the effects of chemo-mechanical polishing and chemical etching on CdZnTe nuclear radiation detectors," Accepted for SPIE Optics & Optoelectronics 2015, Prague, Czech Republic, 13-16 April, 2015, Paper # 9504-17.
- S. U. Egarievwe, I. O. Okwechime, A. Hossain, **J. O. Jow**,et al, "Comparative Study on the Effects of Chemical Treatments on CdZnTe Nuclear Detectors," **2014 IEEE** Nuclear Science Symposium and Medical Imaging Conference Record (NSS/MIC), Paper # R08-65.
- S. U. Egarievwe, D. K. Kithinji, **J. O. Jow**, et al, "Temperature-Gradient Post-Growth Annealing of CdMnTe Wafers for Nuclear Radiation Detection Applications," **2014 IEEE** Nuclear Science Symposium and Medical Imaging Conference Record (NSS/MIC), Paper # R12-6.

Recent Professional Development Activities

- CompTIA CertMaster Security+ Sy0-401(10 CEU)- Certification Training, Downers Grove, Illinois,Nov,2015
- Network Security via Cryptographic Validity(1.0 PDH)- Rochester Institute of Technology, New York, Oct 2015
- Automated People Mover Design/Fault Tree Reliability Analysis of Network Configurations (1.0 PDH)- Rochester Institute of Technology, Oct 2015
- Bridging Network Systems/ Fully Parallel Implementation of the MK Transformation (1.0 PDH)- Rochester Institute of Technology, Oct 2015
- PMP Certification Boot Camp (4.0 CEU) - University of Alabama Huntsville, June 2011, Huntsville, Alabama.

Name

Wanda L. Lavender

Education

Degree	Discipline	Institution	Year
M.S.	Computer Science	Alabama A&M University	2010
B.S.	CIMS	Alabama A& University	1999

Academic Experience

Alabama A&M University, Part-time, Adjunct Professor, (2010-Present)

Non-academic Experience

AMCOM (DOD), Computer Operator/Computer Specialist, Worked for RDEC/CIC as Computer Operator, Worked in Email/Networking/Integration Groups as Computer Specialist working on email systems and software, (1988-2001)

Certifications or Professional Registrations

Current Membership in Professional Organizations

Honors and Awards

Service Activities (within and outside of the institution)

Faculty advisor to student extracurricular group; Mentor current and former students; Support student athletes in my classes by attending their basketball, soccer, softball, and football games. Also support student athletes on the track team and the tennis team; Support the YMTF by inviting them to speak to my classes; Produces a weekly gospel radio program which comes on 2 stations, bringing inspiration and hope to many.

Most important publications and presentations from the last five years

CETL: (Beyond Technology: Preparing Faculty to Thrive In the Online Classroom)
CETL: (Resolving Conflict in the Classroom)
CETL: (Retention: Assessing Why Students Stay and Why They Leave)
CETL: (TED in the Classroom)
CETL: (Student Engagement in the Classroom)
Training: Using Cell Phones in the Classroom
Power Through Series:

Introduction to eLearning, Learning Objectives as Course Infrastructure, Tools of The trade (Part 1), Blackboard training, Student Engagement, Assessment Strategies, Tools of the trade (Part 2)

Recent Professional Development Activities

Appendix L – Equipment

The CS program has three labs for students, located in Room 236, Room 241, Room 243, and one student/faculty research lab, located in Room 253. Student labs can be used by all university students including computer science students. There are a total of 115 computers, 3 projectors and 3 printers in the labs. All computers in the student labs are on a 3-year upgrade schedule. Research lab computer upgrades are based on particular faculty members' research funds. Following is a list of the hardware and software in each open lab:

Lab 236
Contains 31 computers, one printer, and one overhead projector for lecture use.

Microsoft Office 2013
Microsoft Visual Studio 2013
Microsoft Windows 8
Java with NetBeans IDE 8.0.2

Lab 241
Contains 35 computers, one printer, and one overhead projector for lecture use. The computer in this room are setup for dual boot with the LINUX operating system software and Microsoft Windows operating system software.

Microsoft Office 2013
Microsoft Visual Studio 2013
Ubuntu LINUX 13
Microsoft Windows 8
Java with NetBeans IDE 8.0.2
Oracle Database

Lab 243
Contains 33 computers, one printer, and one overhead projector for lecture use. All the computers are running Windows operating system software and some are dual boot with the LINUX operating system software.

Microsoft Office 2013
Microsoft Visual Studio 2013
Ubuntu LINUX 13
Microsoft Windows 8
Java with NetBeans IDE 8.0.2

Lab 253
Contains 10 computers total. Five regular PC computers running Microsoft Windows operating software and five Apple desktop computers running Apple operating system software. This lab also contains a complete cybersecurity lab setup, which include one router, two servers, and two switches, all mounted in a roll able rackmount cabinet.

Microsoft Office 2013
Microsoft Visual Studio 2013
Microsoft Windows 8
Java with NetBeans IDE 8.0.2

Appendix M – Institutional Summary

Programs are requested to provide the following information.

1. The Institution

a. Name and address of the institution

Alabama Agricultural and Mechanical University (AAMU), Founded 1875
4900 Meridian Street, North
Normal, AL 35762

b. Name and title of the chief executive officer of the institution

Dr. Andrew Hugine, Jr.
President, Alabama A&M University

c. Name and title of the person submitting the Self-Study Report.

Dr. Chance M. Glenn, Sr., Dean
College of Engineering, Technology and Physical Sciences

d. Name the organizations by which the institution is now accredited, and the dates of the initial and most recent accreditation evaluations.

Southern Association of Colleges and Schools' Commission on Colleges (SACS)
Initial Accreditation: 1963
Current Accreditation: 2004

2. Type of Control

Public Institution
-A Public Non-profit state supported education institution governed under the laws of the State of Alabama

3. Educational Unit

The Bachelor of Science in Computer Science (BSCS) program is located within the Department of Electrical Engineering and Computer Science, which is one of four departments within the

College of Engineering, Technology and Physical Sciences. The College is one of four at the University.

The Coordinator of the Computer Science Program, Dr. Joel Fu, is directly responsible for administration of the BSCS program. The Coordinator reports directly to the Chairperson of the Department of Electrical Engineering and Computer Science, Dr. Kaveh Heidary. The Chairperson reports directly to the Dean of the College of Engineering, Technology and Physical Sciences, Dr. Chance M. Glenn, Sr. The Dean reports directly to the Provost and Vice-President for Academic Affairs, Dr. Daniel K. Wims. The Provost reports directly to the President of Alabama Agricultural and Mechanical University, Dr. Andrew Hugine, Jr. The President reports to the Board of Trustees of Alabama A&M University.

An organizational chart depicting these relationships is shown in Figure 8.

4. Academic Support Units

The Dean of the College of Engineering, Technology and Physical Sciences is Dr. Chance M. Glenn, Sr. The College comprises two Engineering departments, one Engineering Technology department and one Physics, Chemistry and Mathematics department. The department chairpersons are:

- Electrical Engineering and Computer Science – Dr. Kaveh Heidary
- Mechanical and Civil Engineering – Dr. Mohamed Seif
- Engineering, Construction Management and Industrial Technology – Dr. Michael Ayokanmbi
- Physics, Chemistry and Mathematics – Dr. Mohan Aggarwal

5. Non-academic Support Units

List the names and titles of the individuals responsible for each of the units that provide non-academic support to the program being evaluated, e.g., library, computing facilities, placement, tutoring, etc.

- Library:
  J.F. Drake Memorial Learning Resources Center (LRC)
  Mr. Gary Bush, Acting Director

- Computing Facilities:

Information Technology Services
Dr. Kimberley Marshall, Chief Information Officer (CIO)

- Placement:
  Career Development Services (CDS)
  Ms. Yvette Clayton, Director

- Tutoring:
  Tutorial Assistance Network (TAN)
  Ms. Linda Skeete McCleellan, MS, Program Specialist

- High performance Computing:
  Alabama Supercomputer Center (ASC)
  Mr. David Ivey, Program Manager

- AAMU Office of Admissions:
  Ms. Venita Clisby King, Director

- Title III: Aid for Institutional Development Programs
  Title III Strengthening Grants Program
  Dr. Andrea Cunningham, Director

- Office of Retention & Persistence
  Dr. Constance R. Adams, Director

- Registrar
  Office of the Registrar
  Ms. Brenda K. Williams, Registrar

- CETL:
  Centers for Excellence in Teaching and Learning
  Dr. Juarine Stewart, Director

6. Credit Unit

One semester credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations.

7. Tables

Table 14 details program enrollment and degree data for the BSCS program. Table 15 provides information on the personnel staffing data for the BSCS program.

Table 14. Program Enrollment and Degree Data

Bachelor of Science in Computer Science

	Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
			1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
Current Year	2015-2016	FT	111	60	26	31	-	228	27	0	27	6	0
		PT	1	4	2	0	-	7	16				
1	2014-2015	FT	88	45	32	3	-	195	27	0	13	4	0
		PT	0	3	2	5	-	10	9				
2	2013-2014	FT	90	30	38	29	-	187	19	0	19	9	0
		PT	1	2	3	6	-	12	8				
3	2012-2013	FT	70	56	35	32	-	193	7	0	19	8	0
		PT	2	1	2	0	-	5	16				
4	2011-2012	FT	77	44	33	27	-	181	13	0	16	10	0
		PT	3	4	0	5	-	12	20				

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the on-site visit.

FT--full time
PT--part time

Table 15. Personnel

Bachelor of Science in Computer Science

Year[1]: FALL 2015

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[2]	1	0	0.5
Faculty (tenure-track)[3]	8	0	7.5
Other Faculty (excluding student Assistants)	2	5	3
Student Teaching Assistants[4]	1	0	1
Technicians/Specialists	1	0	0.2
Office/Clerical Employees	1	0	1
Others[5]			

Report data for the program being evaluated.

1. Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.

2. Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

3. For faculty members, 1 FTE equals what your institution defines as a full-time load

4. For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc.

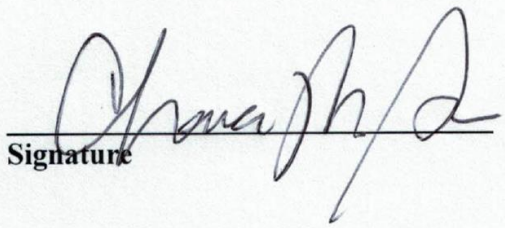
5. Specify any other category considered appropriate, or leave blank.

Signature Attesting to Compliance

By signing below, I attest to the following:

That the Bachelor of Science in Computer Science Program at Alabama A & M University has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Computing Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

Dr. Chance M. Glenn, Sr.
Dean's Name (As indicated on the RFE)



Signature

6/29/16
Date