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Office of Institutional Research

TO: Terry Martin

         Alice Griffin

FROM: Gary Gunderman, Executive Director of Institutional Research and Assessment

RE: CSCEBS and CSCEMS programs

DATE: February 14, 2017

I have reviewed the request to change the CIP Code for the bachelors and masters programs in computer science (CSCEBS and CSCEMS) from their current classification of 11.0101 (Computer and Information Sciences, General) to the more accurate 11.0701 (Computer Science). I agree with this change and approve it.

The description for 11.0701 more accurately describes the topics covered in the curricular requirements leading to these degrees.

I have also reviewed whether or not this CIP Code is commonly used by similar programs at similar institutions. This is important so that the university will be able to obtain benchmark data that is often based on the program's CIP code. Using data available from IPEDS, I found that the 11.0701 is more commonly used for bachelors and graduate level programs than the 11.0101 code. This information supports my approval.

Computer Science B.S. Eight-Semester Degree Program

The following sections contain the list of courses required for the Bachelor of Science in Computer Science (B.S.) degrees with a suggested sequence below.

Not all courses are offered every semester, so students who deviate from the suggested sequence must pay careful attention to course scheduling and course prerequisites. Students wishing to follow the eight-semester degree plan should see the Eight-Semester Degree Policy in the Academic Regulations chapter for university requirements of the program.

First Year	Units	
	Fall	**Spring**
GNEG 1111 Introduction to Engineering I (Sp, Fa)	1	
ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) (Sp, Su, Fa)	3	
CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) (Su, Fa)	3	
MATH 2554 Calculus I (ACTS Equivalency = MATH 2405) (Sp, Su, Fa)	4	
PHYS 2054 University Physics I (ACTS Equivalency = PHYS 2034) (Sp, Su, Fa)	4	
GNEG 1121 Introduction to Engineering II (Sp, Fa)		1
MATH 2564 Calculus II (ACTS Equivalency = MATH 2505) (Sp, Su, Fa)		4
Freshman Science Elective*		4
ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023) (Sp, Su, Fa)		3
History/Government Elective		3
Year Total:	15	15

Second Year	Units	
	Fall	**Spring**
CSCE 2004 Programming Foundations I (Sp, Fa)	4	
CSCE 2114 Digital Design (Sp, Fa)	4	
MATH 2603 Discrete Mathematics (Sp, Su, Fa)	3	
Basic Science Elective With Lab	4	
Social Science Elective	3	
CSCE 2014 Programming Foundations II (Sp, Fa)		4
CSCE 2214 Computer Organization (Sp, Fa)		4
MATH 3103 Combinatorial and Discrete Mathematics (Sp, Fa)		3
Fine Arts Elective		3
Social Science Elective		3
Year Total:	18	17

Third Year	Units

	Fall	Spring
[CSCE 3193](#) Programming Paradigms (Sp, Fa)	3	
[CSCE 3613](#) Operating Systems (Sp, Fa)	3	
[COMM 1313](#) Public Speaking (ACTS Equivalency = SPCH 1003) (Sp, Su, Fa)	3	
[MATH 3083](#) Linear Algebra (Sp, Su, Fa)	3	
[INEG 2313](#) Applied Probability and Statistics for Engineers I (Sp, Fa)	3	
[CSCE 3513](#) Software Engineering (Sp, Fa)		3
[CSCE 4523](#) Database Management Systems (Sp)		3
CSCE Elective		3
[PHIL 3103](#) Ethics and the Professions (Sp, Su, Fa)		3
Free Elective		3
Year Total:	15	15

Fourth Year	**Units**	
	Fall	**Spring**
[CSCE 4133](#) Algorithms (Fa)	3	
[CSCE 4561](#) Capstone I (Fa)	1	
Two CSCE Electives	6	
Two Free Electives	6	
[CSCE 4323](#) Formal Languages and Computability (Sp)		3
[CSCE 4963](#) Capstone II (Sp)		3
CSCE Elective		3
Free Elective		3
Social Science Elective		3
Year Total:	16	15

Total Units in Sequence:		126

* Choose between [PHYS 2074](#) University Physics II or [CHEM 1123](#)/[CHEM 1121L](#) University Chemistry II and lab

Required Courses **Elective Courses**

Courses

CSCE 2004. Programming Foundations I (Sp, Fa). 4 Hours.

Introductory programming course for students majoring in computer science or computer engineering. Software development process: problem specification, program design, implementation, testing and documentation. Programming topics: data representation, conditional and iterative statements, functions, arrays, strings, file I/O and classes. Using C++ in a UNIX environment. Corequisite: Lab component. Prerequisite: MATH 2554 or MATH 2554C with a grade of C or better.

CSCE 2014. Programming Foundations II (Sp, Fa). 4 Hours.

This course continues developing problem solving techniques by focusing on fundamental data structures and associated algorithms. Topics include: abstract data types, introduction to object-oriented programming, linked lists, stacks, queues, hash tables, binary trees, graphs, recursion, and searching and sorting algorithms. Using C++ in a UNIX environment. Corequisite: Lab component. Prerequisite: CSCE 2004 with a grade of C or better.

CSCE 2114. Digital Design (Sp, Fa). 4 Hours.

Introduction to the hardware aspects of digital computers, logic gates, flip-flops, reduction, finite state machines, sequential logic design, digital systems, software design tools, hardware description language (VHDL), and implementation technologies. Corequisite: Lab component. Prerequisite: MATH 2554 or MATH 2554C with a grade of C or better. This course is cross-listed with ELEG 2904.

CSCE 2214. Computer Organization (Sp, Fa). 4 Hours.

Presents the relationship between computing hardware and software with a focus on the concepts for current computers. CPU design topics are covered including various techniques for microprocessor design and performance evaluation. Corequisite: Lab component. Prerequisite: CSCE 2114 with a grade of C or better.

CSCE 3193. Programming Paradigms (Sp, Fa). 3 Hours.

Programming in different paradigms with emphasis on object oriented programming and network programming. Survey of programming languages, event driven programming, and concurrency. Prerequisite: CSCE 2014 with a grade of C or better.

CSCE 3513. Software Engineering (Sp, Fa). 3 Hours.

A modern approach to the current techniques used in software design and development. This course emphasizes the use of modern software development tools, multi-module programming, and team design and engineering. Prerequisite: CSCE 3193 or CSCE 3193H.

CSCE 3613. Operating Systems (Sp, Fa). 3 Hours.

An introduction to operating systems including topics in system structures, process management, storage management, files, distributed systems, and case studies. Prerequisite: CSCE 2014 and CSCE 2214, each with a grade of C or better.

CSCE 3953. System Synthesis and Modeling (Fa). 3 Hours.

This course instructs the students in the use of modern synthesis and modeling languages and approaches for design automation. This course will teach students the use of HDLs and modeling languages for representing and implementing digital computer systems. Prerequisite: CSCE 2214 with a grade of C or better.

CSCE 4013. Special Topics (Irregular). 3 Hours.

Consideration of computer science topics not covered in other courses. Prerequisite: CSCE 3193 and CSCE 2214. May be repeated for up to 12 hours of degree credit.

CSCE 4043. RFID Information Systems Security (INFOSEC) (Irregular). 3 Hours.

Radio frequency identification (RFID) information systems provide information to users about objects with RFID tags. They require the application of information systems security (INFOSEC) to protect the information from tampering, unauthorized information disclosure, and denial of service to authorized users. This course addresses security and privacy in an RFID system. Prerequisite: INEG 2313 or STAT 3013.

CSCE 4114. Embedded Systems (Fa). 4 Hours.

The architecture, software, and hardware of embedded systems. Involves a mixture of hardware and software for the control of a system (including electrical, electro-mechanical, and electro-chemical systems). They are found in a variety of products including cars, VCRs, HDTVs, cell phones, pacemakers, spacecraft, missile systems, and robots for factory automation. Corequisite: Lab component. Prerequisite: CSCE 2214 with a grade of C or better.

CSCE 4123. Programming Challenges (Irregular). 3 Hours.

This course studies the principle methods used in the solution of programming contest problems, e.g., data structures strings, sorting, machine arithmetic and algebra, combinatorics, number theory, backtracking, graph traversal, graph algorithms, dynamic programming, grids, and computational geometry. Prerequisite: CSCE 2014.

CSCE 4133. Algorithms (Fa). 3 Hours.

Provides an introduction to formal techniques for analyzing the complexity of algorithms. The course surveys important classes of algorithms used in computer science and engineering. Prerequisite: CSCE 3193 and (MATH 2603 or MATH 2803) or MATH 3423.

CSCE 4213. Computer Architecture (Sp). 3 Hours.

The architecture of modern scalar and parallel computing systems. Techniques for dynamic instruction scheduling, branch prediction, instruction level parallelism, shared and distributed

memory multiprocessor systems, array processors, and memory hierarchies. Prerequisite: CSCE 2214 with a grade of C or better. This course is cross-listed with ELEG 4983.

CSCE 4233. Low Power Digital Systems (Irregular). 3 Hours.

The reduction of power consumption is rapidly becoming one of the key issues in digital system design. Traditionally, digital system design has mainly focused on performance and area trade-offs. This course will provide a thorough introduction to digital design for lower consumption at the circuit, logic, and architectural level. Prerequisite: CSCE 2214 with a grade of C or better.

CSCE 4253. Concurrent Computing (Irregular). 3 Hours.

Programming concurrent processes; computer interconnection network topologies; loosely coupled and tightly coupled paralleled computer architectures; designing algorithms for concurrency; distributed computer architectures. Prerequisite: CSCE 3193.

CSCE 4263. Advanced Data Structures (Irregular). 3 Hours.

This course continues the study of data structures, algorithmic analysis for these data structures, and their efficient implementation to support standard library in programming languages. Topics include: AVL trees, Red-Black trees, Splay trees, Optimal Binary Search trees, 2-3 tree, 2-3-4 tree, B-trees, Segment trees, Leftist Heaps, Binomial Heaps, Fibonacci Heap, Disjoint Set, Hashing, and big integer with hundreds to thousands of digits.Prerequisite: CSCE 3193.

CSCE 4323. Formal Languages and Computability (Sp). 3 Hours.

Finite Automata and regular languages, regular expressions, context-free languages and pushdown automata, nondeterminism, grammars, and Turing machines. Church's thesis, halting problem, and undecidability. Prerequisite: CSCE 4133.

CSCE 4333. Introduction to Integrated Circuit Design (Fa). 3 Hours.

Design and layout of large scale digital integrated circuits using CMOS technology. Topics include MOS devices and basic circuits, integrated circuit layout and fabrication, dynamic logic, circuit design and layout strategies for large scale CMOS circuits. Students may not receive credit for both CSCE 4333 and CSCE 5223. Prerequisite: ELEG 3214 or ELEG 3933 and MATH 2584.

CSCE 4353. CPLD/FPGA-Based System Design (Irregular). 3 Hours.

Field Programmable Logic devices (FPGAs/CPLDs) have become extremely popular as basic building blocks for digital systems. They offer a general architecture that users can customize by inducing permanent or reversible physical changes. This course will deal with the implementation of logic options using these devices. Prerequisite: CSCE 2214 with a grade of C or better. This course is cross-listed with ELEG 4963.

CSCE 4423. Computer Systems Modeling (Irregular). 3 Hours.

Basic concepts of problem analysis, model design, and simulation experiments. A simulation will be introduced and used in this course. Prerequisite: CSCE 2014 with a grade of C or better and (INEG 2313 or STAT 3013).

CSCE 4433. Cryptography (Irregular). 3 Hours.

This course provides a general introduction to modern cryptography. Topics include: stream ciphers, block ciphers, message authentication codes, public key encryption, key exchange, and signature schemes. Prerequisite: CSCE 2014 with a grade of C or better and (MATH 2603 or MATH 2803).

CSCE 4523. Database Management Systems (Sp). 3 Hours.

Introduction to database management systems, architecture, storage structures, indexing, relational data model, E-R diagrams, query languages, SQL, ODBC, transaction management, integrity, and security. Prerequisite: CSCE 3193 or CSCE 3193H.

CSCE 4543. Software Architecture (Irregular). 3 Hours.

A study of software architecture through the use of case studies drawn from real systems designed to solve real problems from technical as well as managerial perspectives. Techniques for designing, building, and evaluating software architectures. Prerequisite: CSCE 3313 and CSCE 3513.

CSCE 4561. Capstone I (Fa). 1 Hour.

CSCE students complete a comprehensive software capstone project during their final year of undergraduate studies. The project is done over 2 semesters in phases: concept, formal proposal, implementation, and presentation. The projects include and may require the integration of software and human factors and hardware elements and are developed to software engineering methodologies. Prerequisite: CSCE 3513 and (CSCE 3613 or CSCE 3613H) and completion of 96 credit hours.

CSCE 4613. Artificial Intelligence (Irregular). 3 Hours.

Introduction to intelligent agents, AI languages, search, first order logic, knowledge representation, ontologies, problem solving, natural language processing, machine vision, machine learning, and robotics. Prerequisite: CSCE 2014 with a grade of C or better.

CSCE 4623. Mobile Programming (Irregular). 3 Hours.

An introduction to software development on mobile devices. The major topics covered in this course include underlying concepts and principles in mobile programming, as well as hands-on programming experience on mobile devices with an emphasis on smartphones. Prerequisite: CSCE 3193 or CSCE 3193H.

CSCE 4643. Graphics Processing Units Programming (Irregular). 3 Hours.

This course provides an introduction to massively parallel programming using Graphics Processing Units (GPUs). Topics include basic programming model, GPU thread hierarchy, GPU

memory architecture, and performance optimization techniques and parallel patterns needed to develop real-life applications.Prerequisite: CSCE 2014 with a grade of C or better.

CSCE 4753. Computer Networks (Irregular). 3 Hours.

This course is an introductory course on computer networks. Using the Internet as a vehicle, this course introduces underlying concepts and principles of modern computer networks, with emphasis on protocols, architectures, and implementation issues. Prerequisite: INEG 2313 or STAT 3013.

CSCE 4813. Computer Graphics (Irregular). 3 Hours.

Introduction to the theory and algorithms used in computer graphics systems and applications. Topics include: 2D and 3D geometric models (points, lines, polygons, surfaces), affine transformations (rotation, translation, scaling), viewpoint calculation (clipping, projection), lighting models (light-material interactions, illumination and shadow calculation). Students will implement their own graphics pipeline to demonstrate many of these techniques. Higher level computer graphics applications will be created using OpenGL. Prerequisite: CSCE 2014 with a grade of C or better.

CSCE 4853. Information Security (Irregular). 3 Hours.

This course covers principles, mechanisms, and policies governing confidentiality, integrity, and availability of digital information. Topics to be covered include security concepts and mechanisms, security policies, multilevel security models, system vulnerability, threat and risk assessment, basic cryptography and its applications, intrusion detection systems. Prerequisite: CSCE 3193 or CSCE 3193H.

CSCE 4914. Advanced Digital Design (Irregular). 4 Hours.

To master advanced logic design concepts, including the design and testing of synchronous and asynchronous combinational and sequential circuits using state of the art CAD tools. Corequisite: Lab component. Prerequisite: CSCE 2114 or ELEG 2904. This course is cross-listed with ELEG 4914.

CSCE 4963. Capstone II (Sp). 3 Hours.

CSCE students complete a comprehensive capstone project during their final year of undergraduate studies. The project is done over two consecutive semesters in phases: concepts, formal proposal, implementation, and presentation. The projects include and may require the integration of software, human factors, and hardware elements and are developed using software engineering methodologies. Prerequisite: CSCE 4561.