UNIVERSITY *of* ARKANSAS

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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.

Graduate Level Courses

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

CSCE 5013. Advanced Special Topics in Computer Science or Computer Engineering (Irregular). 3 Hours. Consideration of current computer engineering or computer science topics not covered in other courses.

CSCE 5033. Advanced Algorithms (Irregular). 3 Hours.
Design of computer algorithms, with primary emphasis on the development of efficient implementation.

CSCE 5043. Advanced Artificial Intelligence (Irregular). 3 Hours.
In-depth introduction to AI. Topics include: philosophical foundations, cognition, intelligent agents, AI languages, search, genetic algorithms, first order and modal logic, inference, resolution, knowledge representation, ontologies, problem solving, planning, expert systems, uncertainty, probabilistic reasoning, fuzzy logic, machine learning, natural language processing, machine vision, and robotics.

CSCE 5063. Machine Learning (Irregular). 3 Hours.
An introduction to machine learning, with particular emphasis on neural network techniques. This course presents the basic principles underlying algorithms that improve with experience, and covers using them effectively for modeling data and making predictions.

CSCE 5073. Data Mining (Irregular). 3 Hours.

This course surveys the most common methods used in data mining and machine learning. It involves several projects in which students will implement tools that are useful for mining knowledge from data and making predictions. The course will study both heuristic algorithms and statistical techniques.

CSCE 5203. Advanced Database Systems (Irregular). 3 Hours.
Topics include: object databases, distributed databases, XML query, data warehouses, network as database systems, peer-peer data sharing architectures, data grids, data mining, logic foundations, semantic databases, spatial and temporal databases, and knowledge bases.

CSCE 5213. Bioinformatics (Irregular). 3 Hours.
Application of algorithmic techniques to the analysis and solution of biological problems. Topics include an introduction to molecular biology and recombinant DNA technology, biological sequence comparison, and phylogenetics, as well as topics of current interest.

CSCE 5263. Computational Complexity (Irregular). 3 Hours.
Turing machines, recursion theory and computability, complexity measures, NP-completeness, analysis on NP-complete problems, pseudo-polynomial and approximation.

CSCE 5283. Graph and Combinatorial Algorithms (Irregular). 3 Hours.
A study of algorithms for graphs and combinatorics with special attention to computer implementation and runtime efficiency.

CSCE 5313. Advanced Operating Systems (Irregular). 3 Hours.
Concurrent processes and process communication; mutual exclusion and synchronization principles; kernel philosophy; resource allocation and deadlock; and case studies of specific operating systems.

CSCE 5323. Computer Security (Irregular). 3 Hours.
Study of a broad selection of contemporary issues in computer security. Topics include access control, security policies, authentication methods, secure system design, and information assurance.

CSCE 5333. Computer Forensics (Irregular). 3 Hours.
Various methods for identification, preservation, and extraction of electronic evidence at a computer crime scene. Specific topics include auditing and investigation of network and host intrusions, computer forensics tools, resources for system administrators and information security officers, legal issues related to computer and network forensics.

CSCE 5343. Advanced Software Engineering (Irregular). 3 Hours.
This course is about software metrics and models. It will focus on quantitative methods and techniques for management of software projects, design of software systems, and improvement of software quality. The material covered will be metrics and models used in the software lifecycle, such as software requirements metrics, design metrics, implementation metrics, testing metrics, effort estimation model.

CSCE 5433. Advanced Cryptography (Irregular). 3 Hours.

This course provides an in-depth look into some facet of either cryptographic theory or the implementation of cryptography. Topics may include: the discrete logarithm problem, integer factorization, information theory, elliptic curves, lattices, pseudorandom number generators, zero-knowledge proofs, and quantum cryptography.

CSCE 5533. Advanced Information Retrieval (Irregular). 3 Hours.
Study of the architecture, implementation, and evaluation of current information retrieval systems. Students will apply their knowledge of programming and data structures to implement a large system with an emphasis on efficiency and scalability. They will study current research in the field and implement individual or group projects on advanced topics.

CSCE 5543. Statistical Natural Language Processing (Irregular). 3 Hours.
Introduction to statistical natural language processing (NLP). Covers the theory and algorithms needed for building NLP tools, provides broad coverage of mathematical and linguistic foundations, and detailed discussion of statistical methods for text mining and information extraction. Current research and applications of statistical NLP will be discussed.

CSCE 5633. Network Performance Evaluation (Irregular). 3 Hours.
A study of performance modeling tools for telecommunication networks, computer networks, and wireless networks.

CSCE 5643. Computer Communications Networks (Irregular). 3 Hours.
A study of computer communication networks, including the data link layer, routing, flow-control, local area networks, TCP/IP, ATM, B-ISDN, queuing analysis, and recent developments in computer communications.

CSCE 5653. Network Security (Irregular). 3 Hours.
This course introduces security and secrecy in a networked environment. It is intended to familiarize students with the elements of secure communication, and how they inter-relate to provide secure networks in public and private settings.

CSCE 5663. Database Security (Irregular). 3 Hours.
This is an advanced course covering security issues in database systems. Topics to be covered include discretionary and mandatory access control policies, multilevel secure database systems, auditing, data recovery, database intrusion detection, database insider threat, etc.

CSCE 5683. Image Processing (Irregular). 3 Hours.
The objective of this class is to give students a hands-on introduction to the fundamentals of image processing. A variety of image processing techniques and applications will be discussed including image enhancement, noise removal, spatial domain and frequency domain filtering, image restoration, color image processing, image compression, edge detection and image segmentation.

CSCE 5703. Computer Vision (Irregular). 3 Hours.
The objective of this course is to give students a hands-on introduction to the fundamentals of computer vision. Topics include image formation, object modeling, image processing, feature and edge detection, image segmentation, motion estimation, depth from stereo, shape description and object recognition. Prerequisite:

CSCE 590V. Advanced Individual Study (Irregular). 1-3 Hour.
Advanced graduate level individual study directed by faculty in current research topics, state of the art, or advanced methodology in one of the major computer science or computer engineering areas.