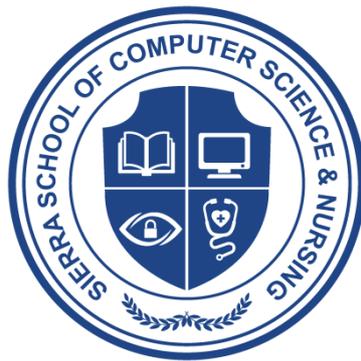


Sierra School of Computer Science in AEU



Catalog 2017-2018

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Index

Welcome Message from Dean	3
Relationship of Sierra School of Computer Science with America Evangelical University	4
Mission, Vision and Goals of Sierra School of Computer Science in AEU:	4
Approval and Accreditation:	4
Program Learning Outcomes	5
Admissions Requirements	7
Method of Instruction	7
Program Requirements	7
Prerequisite Courses	8
Unit Transfer Policy	8
Graduation Requirements	8
State Approval and Accreditation	9
Status as an accredited institution	9
School Fees	10
Retention of School Records	10
Housing Policies	10
Orientation	11
Chapel	11
Complaint	11
Definition of Credit Hour	11
Disclosure Statement, Question and Complaints	11
Enrollment Agreement	12
Spiritual Requirements	12
Health Insurance	12
Equal Opportunity	12
Non Discrimination Statement	12
Curriculum for MSCS and MSCIS:	13
Faculty	14
Master of Science in Computer Science	16
Master of Science in Computer Information Systems	25

Welcome Message from Dean

Welcome to the Sierra School of Computer Science at AEU. The institution encourages giving students an insight into Computer Science (MSCS) and Computer Information Systems (MSCIS), and more opportunities that the institution can provide in these subjects.

Computer Science is an amazing topic and now essential in our lives. Almost every piece of current life involves computer science and computer information system such as smart phones, tablets, TVs, smart watches, personal computer, navigation systems, cars, gaming, security and medical services. Our world needs more digital rather than analog. The computer science and computer information system will provide the future. In the near future the cloud system will connect us all through small portable devices, enhancing social networking and allowing us to exchange audio and video data from our daily lives.

Our curriculum emphasizes six learning outcomes in computer science. Such as theory of computation, applied mathematics software management, software engineering, network technology, and integrate biblical and theological perspectives. And computer information systems focus on five learning outcomes such as computer information system analysis, system development, identifying information technology, manage information technology, and integrate biblical and theological perspectives.

Be a student in Sierra School of Computer Science and get full understanding of amazing subjects and armed yourself with the skills and technologies under the mission statement to have a challenging a tough but exciting career ahead of you.

Dean of Sierra School of Computer Science
Bryan Han, Ph.D.

Relationship of Sierra School of Computer Science with America Evangelical University

Sierra School of Computer Science and Nursing in AEU is a Los Angeles Branch of America Evangelical University. And its branch is located in 1818 S Western Ave # 300, Los Angeles, California, USA.

Whereas AEU offers programs leading to Bachelor, Master and Doctor in Theology, Ministry, Counseling and Business, Sierra School of Computer Science and Nursing in AEU offers programs leading to Master of Computer Sciences in Computer Science, Master of Computer Science in Computer Information System, and Bachelor of Science in Nursing.

Mission, Vision and Goals of Sierra School of Computer Science in AEU:

In keeping with the mission, vision and goals of AEU, the Sierra School of Computer Science and Nursing in AEU endeavors to educate students to be leaders and professionals in the area of computer science and nursing.

Approval and Accreditation:

America Evangelical University, in which Sierra School of Computer Science and Nursing in AEU is a part, is approved by the Bureau for Private Postsecondary Education (BPPE) to operate as a accredited institution, is authorized by USCIS to issue I-20 to international students, and has received initial accreditation by the Association for Biblical Higher Education (ABHE).

Program Learning Outcomes

Master of Science in Computer Science

Upon completion of the Master of Science in Computer Science program of study at Sierra School of Computer Science in AEU, the student will be able to demonstrate the following competencies:

1. Demonstrate the proficient knowledge on the theory of computation and advanced level concepts of programming languages and apply such knowledge and techniques to industrial projects.
2. Apply mathematical methodologies or scientific solutions in the literature, e.g., heuristic solutions, to solve computational tasks with respect to create and evaluate project
3. Manage software project with advanced knowledge regarding system analysis, documentation, and develop requirements, in order to design and implement computer applications system.
4. Perform the software engineering process to develop software that matches the large-scale service platform or system according to customer requirements.
5. Apply network techniques based on the knowledge of communication protocols including the latest mobile trends to solve the practical networking issues such as trouble-shooting, efficient server management, and security handling.
6. Integrate biblical and theological perspectives in the field where computer science plays a vital role.

Master of Science in Computer Information Systems

Upon completion of the Master of Science in Computer Information Systems program of study at Sierra School of Computer Science in AEU, the student will be able to demonstrate the following competencies:

1. Advanced knowledge in the analysis and documentation of requirements for architecture, design, and implementation of computer information systems.
2. Proficiency in software and computing skills as they pertain to the design and implementation of database systems, security systems, systems analysis, and design.
3. Competence sufficient to identify current and emerging information technologies that may have strategic value for enterprise; assess where those technologies have value; and manage the implementation of those technologies in the enterprise.
4. Manage IT project advanced knowledge in the analysis and documentation of requirements for design and implementation of computer information systems.
5. Integrate biblical and theological perspectives in the field where computer information systems play a vital role.

Admissions Requirements

In order to secure admission into the Master of Science in Computer Information Systems program at Sierra School of Computer Science in AEU, every applicant will have to meet the following minimum requirements:

1. Completion of Application Form for Admission.
2. At least one letter of recommendation from faculty, counselors, school administrators, employers, or church leaders.
3. Possession of or candidacy for an accredited Bachelor's degree or its equivalent.
4. Official transcripts from all schools including Bachelor Degree.
5. Payment of \$100.00 application fee.
6. English Proficiency Exam (TOEFL, IELTS, or ESL Placement test, if English is not primary language; waived if graduated high school or completed secondary education in the U.S.

Method of Instruction

Classes incorporate lectures, instructional work in class, demonstrations, one-on-one tutorials, library research, and comprehensive examinations within each course. Except for internships and field trips, all instruction is conducted in a classroom setting.

Program Requirements

Length:	Approximately 2 years
Core Courses in CS or CIS:	6 Courses
Elective Courses in CS or CIS:	4 Courses
Total CS or CIS Requirements:	10 Courses
Bible and Theology Requirements:	2 Courses
Total Program Requirements:	12 Courses

***1 Course is equivalent to 3 semester units or 4 quarter units**

Prerequisite Courses

Prerequisite courses are required for non-computer information systems undergraduate majors or those students with insufficient background in computer information systems. Students must choose five elective courses.

Unit Transfer Policy

A maximum of two courses may be transferred into the program from a nationally or regionally-accredited college or university. The acceptance of credit hours is at the discretion of Sierra School of Computer Science in AEU, depending upon the academic rigor of the prior course experience.

Graduation Requirements

To receive the Master of Science in Computer Information Systems from Sierra School of Computer Science in AEU, the student must meet the following requirements:

- Complete the MSCIS that includes major courses, elective course, and Christian studies.
- Complete all CIS course requirements within 150% of the published length of the academic program.
- Attain a cumulative quality point average of 3.0 on a 4.0 scale in the major.
- Attain an overall cumulative quality point average of 3.0 on a 4.0 scale.
- Pass all exams required by each of the courses.

State Approval and Accreditation

Sierra School of Computer Science in AEU is approved by California State Bureau for Private Postsecondary Education (BPPE) to operate an accredited institution which offers the approved educational programs (#23621227).

Also, Sierra School of Computer Science in AEU has been seeking accreditation through Association for Biblical Higher Education (ABHE) and has achieved an initial accreditation status with ABHE in February, 2015. Sierra School of Computer Science in AEU is approved by the Bureau for Private Postsecondary Education to offer programs leading to Master of Science in Computer Science and Master of Science in Computer Information Systems. **For more information, call the Bureau for Private Postsecondary Education at (916) 431-6959, or toll-free at (888) 370-7589, or visit its website at www.bppe.ca.gov.**

Status as an accredited institution

Sierra School of Computer Science in AEU is an accredited institution. Also, Sierra School of Computer Science in AEU was granted institutional accreditation by the Association for Biblical Higher Education (ABHE) Commission on Accreditation in February 2015. The institution is scheduled for its reaffirmation review in 2020; consequently, all degree and certificate programs offered are part of the institution's accreditation profile.

School Fees

	Items	Fee
1	Application, one time	\$100
2	Administrative Processing	\$100
3	Initial I-20	\$200
4	SEVIS (SEVP I-901)	\$200
5	Registration	\$50
6	Student ID	\$20
7	Graduation	\$300
8	Readmission, one time	\$100
9	Late Registration Fee	\$100
10	Official Transcript	\$10
11	Return Check	\$25
12	Tuition (per semester unit)	\$500
13	Prerequisite (per course)	\$800
14	Facility and Equipment Fee (per term)	\$100
15	Reprinting I-20	\$20
16	Shipping and Handling	\$100

***All Fees are non-refundable**

Retention of School Records

The Board of Trustees of have adopted a resolution to the effect that all school records of the university shall be retained for a minimum of five years with the exception of student transcripts kept permanently. The Audit Committee of the Board of Trustees will from time to time verify that the school administrators are in fact adhering to the requirements of this resolution. All records of the University are located in the main office. The important records, including each student's file, grade reports, and financial records, are stored in a safety fire-proof cabinet and on computer disks. In case of the closing of the school, the Union Evangelical Church will be responsible to retain all documents.

Housing Policies

The university does not operate a dormitory or other housing facility, but will assist students in locating adequate housing near the campus. Some students find housing in a local residence hotel; others share an apartment, or rent a room from members of a local church. In this case, the cost may be reduced.

Orientation

The school offers academic orientation each year for all new students and all continuing students. The orientation sessions are designed to introduce new students school life, policies, regulations, faculty members, administration, and the surrounding community

Chapel

Chapel worship service is conducted under the direction of the faculty. All regular students are expected to attend the chapel. Chapel service is designed for the spiritual growth and fellowship of the students.

Complaint

A student or any member of the public may file a complaint about this institution with the Bureau for Private Postsecondary Education by calling (888-370-7589) or by completing a complaint form, which can be obtained on the bureau's Internet Web site (www.bppe.ca.gov).

Definition of Credit Hour

The school awards academic credits based on the Carnegie unit which awards one unit of credit for each 50 minute class session per week. For each credit, students are expected to complete a minimum of two hours of academic work (study, preparation, etc.) outside of class each week. Some courses may require three or more hours of outside work each week per credit. The policy on academic credit is based on those generally accepted in degree-granting institutions of higher education.

Disclosure Statement, Question and Complaints

The school is a private institution and is approved to operate by the Bureau for Private Postsecondary Education (BPPE). As per the California Education Code § 94897 (l), approval to operate means compliance with state standards as set forth in the California Private Postsecondary Education Act of 2009, and the regulations of the CEC section given above.

“Any questions a student may have regarding this catalog that have not been satisfactorily answered by the institution may be directed to the Bureau for Private Postsecondary Education at 2535 Capitol Oaks Drive, Suite 400 Sacramento, CA 95834, www.bppe.ca.gov, 916.431.6959”

“The California Bureau for Private Postsecondary Education (BPPE) has a formal complaint process. “A student or any member of the public may file a complaint about this institution with the Bureau for Private Postsecondary Education by calling (toll-free telephone number) or by completing a complaint form, which can be obtained on the bureau's internet website in the following”:

Bureau for Private Postsecondary Education
2535 Capitol Oaks Drive, Suite 400, Sacramento, CA 95833

P.O. Box 980818, West Sacramento, CA 95798-0818
Phone: (916)431-6959 Toll Free: (888) 370-7589
Fax: (916) 263-1897

Online: http://www.bppe.ca.gov/consumer_complaint.pdf

Enrollment Agreement

“As a prospective student, you are encouraged to review this catalog prior to signing an enrollment agreement. You are also encouraged to review the School Performance Fact Sheet, which must be provided to you prior to signing an enrollment agreement.” A student or any member of the public may file a complaint about this institution with the Bureau for Private Postsecondary Education by calling (888) 370-7589 or by completing a complaint form, which can be obtained on the bureau’s Internet Web site (<http://www.bppe.ca.gov>)

Spiritual Requirements

All applicants must be regenerated and baptized in the name of the Father, the Son, and the Holy Spirit. Also, applicants should not have any addictions to intoxicating liquor, tobacco, or any kinds of drugs. The applicants should be shown as potential Christian leaders with good character in the areas of mission work, church ministry, and religious education.

Health Insurance

Every student must have some form of health insurance to be allowed to register. All full-time degree students (8 units or more for graduate students; 12 units or more for all others) are required to have health insurance. Bring proof of insurance to registration. All students are strongly urged to enroll all dependents. International students are required to enroll ALL dependents accompanying them to the United States. ALL international students are required to have proof of insurance, regardless of number of units or degree status.

Equal Opportunity

The school seeks a diverse student body. All applicants receive consideration for admissions regardless of race, color, age, sex, physical condition, or national origin.

Non Discrimination Statement

The AEU does not discriminate against any person on the basis age, sex, religion, race, color, disability, national or ethnic origin or political affiliation in its admission policies, its employment opportunities or other policies or practices.

Curriculum for MSCS and MSCIS:

	MSCS	MSCIS
Prerequisite (5 Courses)	Computer Programming Computer Data Structure Algorithms Introduction to Information Structures Introduction to Computer Communications	Computer Programming Computer Data Structure Algorithms Introduction to Information Structures Introduction to Computer Communications
Core (6 out of 10)	Information Structures with Java Programming Languages Software Engineering	Information Structures with Java Programming Languages Information Systems Analysis and Design
	Computer Communications Advanced Computer Networks	Computer Communications Business Data Communication and Network
	Mobile Application Programming Information Integration on the Web	Web Application Development Server-Side Web Development
	Security and Privacy in Computer Systems Wireless Internet Security	Network Security Enterprise Information Security
	Advanced Database Systems	D.B. Design and Implementation for Business
	Analysis of Algorithms Topics in Data Mining Advanced Big Data Analytics Theory and Computational Methods for Opt.	IT Strategy and Management Information Technology Project Management Distributed S.W. Develop. and Management Agile Software Development
	Topics in Numerical Analysis Topics in Distributed Processing Systems Advanced Topics in Internet routing Network Simulation and Perf. Analysis 5G Mobile Communications Introduction to Cryptography A.I.: Principles and Techniques Embedded Software Programming	Database Security Digital Forensics and Investigations Mobile Forensics IT Security Policies and Procedures Rich Internet Application Development
	Elective (4 Courses)	

Faculty

Dr. Bryan Han

University of Southern California, Ph.D. in Mechanical Engineering, 2007

University of Southern California, M.S. in Mechanical Engineering, 2004

Dr. Smith Oh

UCLA, Postdoctoral Research Associate, 2016

Chungnam National University, Ph.D in Computer Engineering, 2015

Chungnam National University, M.S. in Computer Science and Engineering, 2009

Dr. James Lee

UCLA Visiting Assistant Researcher in the Department of Computer Science, 2015

Chungnam National University, Ph.D in Computer Science and Engineering, 2014

Chungnam National University, M.S. in Computer Science and Engineering, 2010

Dr.Harris G. Wang

University of California, Los Angeles, Ph.D in Electrical Engineering, 1994

University of California, Los Angeles, Engr.D in Electrical Engineering, 1992

Northeastern University, M.S. in Computer Science, 1984

Prof. Martin Lee

National University, M.S. in Cyber Security and Information Assurance, 2017

Seongkonghoe University, B.S. in Computer Information Systems, 2006

Dr. Timothy Lee

University of Northern Colorado, Greeley, Colorado, Ph.D. in Applied Statistics

Stanford University, Stanford, California, M.S. in Statistics (Data Analysis and Statistical Computation)

Assistant Professor, CSU, Los Angeles, CA 1988-1991

Prof. Kuangkai Rex Lu

Pacific States University, M.S. in Computer Science, California, 2003

KungWu Institution of Technology and Commerce, Electronic Engineering, 1996

Prof. M. Faisal Ashfaque

California State University, Los Angeles, M.S. in Information Technology and Management,
2010

California State University, Los Angeles, B.S. in Computer Information System, 2008

Master of Science in Computer Science

Sierra School of Computer Science in AEU

Master of Science in Computer Science (MSCS) Curriculum & Course Descriptions

(2 years program – 12 Courses*)

***1 Course is equivalent to 3 semester units or 4 quarter units**

General Description and Program Objective

The Master of Science in Computer Science (MSCS) program is designed for students with some experience in computer technology and programming who desire to advance their knowledge and skills in the area of the design, programming, and application of computing systems. The emphasis is on providing students with the basic analytic skills and strong aptitude for mathematics, programming and logical reasoning. The program is also designed to help students to understand fundamental and important current issues in computer science and computer engineering. As such, the program is meant to provide students with opportunity to be prepared for employment or to pursue advanced degrees.

The program includes six (6) pre-determined core computer science major courses and four (4) elective courses. Every student in majoring MS in Computer Science must take 6 major courses. The core computer science courses are as follows: programming languages, computer communications, software engineering, analysis of algorithms, advanced database systems and advanced computer networks. And every student can select any 4 courses from the list of elective courses based on their interest or concentration in an attempt to prepare their employment or to advance their research. The elective courses have the following four major categories: data science, computer networks, network security, and application programming. Elective courses are as follows: topics in data mining, information integration on the web, advanced big data analytics, theory and computational methods for optimization, topics in numerical analysis, topics in distributed processing systems, advanced topics in internet routing, network simulation and performance analysis, security and privacy in computer systems, 5G mobile communications, wireless internet security, introduction to cryptography, artificial intelligence: principles and techniques, mobile application programming, and embedded software programming.

However, students can choose any class in any combination depending on their purpose in employment or interest in research. Every course has an emphasis on the concepts and techniques related to computer science. Students who do not have computer major in the bachelor program will be required to take 5 courses of prerequisite courses. There is a strong emphasis on biblical values and theological education. Courses in computer science major will be taught through the lenses of Christian principles.

Master of Science in Computer Science Program sequence chart

Num	Courses
Prerequisite:	Non-computer major students must take 5 Courses MSCS300 Computer Programming; MSCS310 Data Structure; MSCS 320 Algorithms; MSCS 330 Introduction to Information Structures; MSCS 340 Introduction to Computer Communications
1 st term	MSCS 400 Information Structures with Java MSCS 430 Computer Communications MSCS 450 Mobile Application Programming MSCS 470 Security and Privacy in Computer Systems MSCS 500 Analysis of Algorithms MSCS 510 Topics in Data Mining *Choose One Bible or Theology Course
2 nd term	MSCS 410 Programming Languages MSCS 440 Advanced Computer Networks MSCS 460 Information Integration on the Web MSCS 480 Wireless Internet Security MSCS 520 Advanced Big Data Analytics MSCS 530 Theory and Computational Methods for Optimization *Choose One Bible or Theology Course
3 rd term	MSCS 420 Software Engineering

	<p>MSCS 430 Computer Communications</p> <p>MSCS 450 Mobile Application Programming</p> <p>MSCS 490 Advanced Database Systems</p> <p>MSCS 540 Topics in Numerical Analysis</p> <p>MSCS 550 Topics in Distributed Processing Systems</p> <p>*Choose One Bible or Theology Course</p>
4 th term	<p>MSCS 400 Information Structures with Java</p> <p>MSCS 440 Advanced Computer Networks</p> <p>MSCS 460 Information Integration on the Web</p> <p>MSCS 470 Security and Privacy in Computer Systems</p> <p>MSCS 560 Advanced Topics in Internet routing</p> <p>MSCS 570 Network Simulation and Performance Analysis</p> <p>*Choose One Bible or Theology Course</p>
5 th term	<p>MSCS 410 Programming Languages</p> <p>MSCS 430 Computer Communications</p> <p>MSCS 450 Mobile Application Programming</p> <p>MSCS 480 Wireless Internet Security</p> <p>MSCS 580 5G Mobile Communications</p> <p>MSCS 590 Introduction to Cryptography</p> <p>*Choose One Bible or Theology Course</p>
6 th term	<p>MSCS 420 Software Engineering</p> <p>MSCS 440 Advanced Computer Networks</p> <p>MSCS 460 Information Integration on the Web</p> <p>MSCS 490 Advanced Database Systems</p> <p>MSCS 600 Artificial Intelligence: Principles and Techniques</p> <p>MSCS 610 Embedded Software Programming</p> <p>*Choose One Bible or Theology Course</p>

Course Descriptions

Prerequisite Courses for non-computer major students (5 courses)

MSCS 300 Computer Programming

This course teaches fundamental concepts and terminology of computer programming. Students will develop skills in designing and writing simple computer programs. The course requires no programming background. This is a programming intensive course.

MSCS 310 Data Structure

This course covers fundamental data structures and algorithms using the Java programming language. This course will sharpen students' programming skills, and expand their knowledge of basic data structures and algorithms. The course extends object-oriented programming techniques to cover Java's API and data structures, such as hash tables, linked lists, stacks, queues, and binary trees, and provides an introduction to the analysis of algorithms that operate on those structures.

MSCS 320 Algorithms

This course introduces students to the analysis and design of computer algorithms. This course helps student analyzing the asymptotic performance of algorithms, demonstrating knowledge of major algorithms and data structures, applying important algorithmic design paradigms and methods of analysis, and synthesizing efficient algorithms in common engineering design situations.

MSCS 330 Introduction to Information Structures

This course covers the introduction to the object-oriented approach to software design and development in Python. It includes a detailed discussion of programming concepts starting with the fundamentals of data types, control structures methods, classes, interfaces, creating user interfaces, and exceptions. Upon completion of this course the students will be able to apply software engineering criteria to design and implement basic applications.

MSCS 340 Introduction to Computer Communications

The course is the introduction to computer communication protocols. The primary emphasis is on conceptual issues in the design and implementation of computer internetworks.

Core/Major Courses in Computer Sciences (6 of 10 courses)

MSCS 400 Information Structures with Java

This course covers the concepts of object-oriented approach to software design and development using the Java programming language. It includes a detailed discussion of programming concepts starting with the fundamentals of data types, control structures methods, classes, applets, arrays and strings, and proceeding to advanced topics such as inheritance and polymorphism, interfaces, creating user interfaces, exceptions, and streams. Upon completion of this course the students will be able to apply software engineering criteria to design and implement Java applications that are secure, robust, and scalable.

MSCS 410 Programming Languages

This course discusses the design, use, and implementation of imperative, object-oriented, and functional programming languages. The course also deals with scoping, type systems, control structures, functions, modules, object orientation, exception handling, and concurrency. A study also includes but is not limited to a variety of languages such as C++, Java, Ada, Lisp, and ML, and concepts that are reinforced by programming exercises.

MSCS 420 Software Engineering

This course focuses on large-scale software development. This course presents modern software engineering techniques and examines the software life cycle, including software specification, design, implementation, testing, and maintenance.

MSCS 430 Computer Communications

The course is a study to computer communication protocols. The primary emphasis is on conceptual issues in the design and implementation of layered architecture of computer internetworks.

MSCS 440 Advanced Computer Networks

This course deals with issues of the design and implementation of techniques essential for engineering robust networks. A study includes but is not limited to networking principles, transmission control protocol/internet protocol, naming and addressing (domain name system), data encoding/decoding techniques, link layer protocols, routing protocols, transport layer services, congestion control, quality of service, network services, programmable routers and overlay networks.

MSCS 450 Mobile Application Programming

This course provides students with a comprehensive understanding of the tasks related to the

development of web-based mobile applications. The topics include the design, interface building, resource management and code elaboration aspects of these applications. The concepts students that learn can be applicable to any mobile operating system but special attention will be given to the Android Platform.

MSCS 460 Information Integration on the Web

This course will focus on foundations and techniques for information extraction, modeling and integration. Topics covered include semantic web (RDF, OWL, SPARQL), linked data and services, mash-ups, theory of data integration, schema mappings, record/entity linkage, data cleaning, source modeling, and information extraction. The class will be run as a lecture course with significant hands-on experience.

MSCS 470 Security and Privacy in Computer Systems

The course covers fundamental principles of building secure systems and techniques to protect data privacy. Topics include access control mechanisms, operating systems security, malicious code threats and software security, trusted computing, content protection, and database security. The course will also study existing technical approaches to protecting privacy, including Web anonymizers and anti-censorship tools, as well as policy and legal aspects of privacy.

MSCS 480 Wireless Internet Security

This course covers fundamental principles, architectures, and standards of modern wireless communication systems, as well as specific applications and uses of these systems. This course not only surveys the state of the art in wireless networks and security, but also reviews protocols, which are currently being deployed, as well as many which are still being developed.

MSCS 490 Advanced Database Systems

This course broadly introduces database systems, including the relational data model, query languages, database design, index and file structures, query processing and optimization, concurrency and recovery, transaction management and database design. Student acquires hands-on experience in working with database systems and in building web-accessible database applications.

Elective Courses in Computer Science (4 Courses)

Students must choose four courses from the following Elective course listing:

MSCS 500 Analysis of Algorithms

This is a course of study on advanced level of design and analysis of algorithms. It discusses the topics such as approximation, randomized algorithms, probabilistic analysis, heuristics, on-line algorithms, competitive analysis, models of memory hierarchy, parallel algorithms, number-theoretic algorithms, cryptanalysis, computational geometry, computational biology, network algorithms, etc.

MSCS 510 Topics in Data Mining

This course is a study of algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data.

MSCS 520 Advanced Big Data Analytics

This class aims to provide an overview of advanced machine learning, data mining and statistic techniques that arise in real data analytic applications. Selected topics include topic modeling, structure learning, time-series analysis, learning with less supervision, and massive-scale data analytics. One or more applications associated with each technique will also be discussed.

MSCS 530 Theory and Computational Methods for Optimization

This course is an introduction to the basic theories of optimization starting from the characterization of optimal solutions for unconstrained and constrained optimization problems using tools of multiple variable calculus and linear algebra.

MSCS 540 Topics in Numerical Analysis

This course is a study of topics such as elements of error analysis, real roots of an equation, polynomial approximation by finite difference and least square methods, interpolation, quadrature, numerical solution of ordinary differential equations, and numerical solutions of systems of linear equations. The student should expect to program a computer in addition to using a graphing calculator.

MSCS 550 Topics in Distributed Processing Systems

This course introduces distributed-networked computer systems. Topics include: distributed control and consensus, notions of time in distributed systems, client/server communications

protocols, middleware, distributed file systems and services, fault tolerance, replication and transparency, peer-to-peer systems, case studies of modern commercial systems and research efforts.

MSCS 560 Advanced Topics in Internet routing

This course is a study of Internet routing with specific attention given to emerging trends. This course focuses on the concepts of traffic shaping, advanced exterior gateway routing protocols, label switching technologies, and quality of service.

MSCS 570 Network Simulation and Performance Analysis

The course applies the concepts of available modeling techniques, including mathematical methods like Markov chains and Petri nets, and simulation methods. Models are usually too large to be handled by a computer system, and, due to model complexity, model development is very time consuming. Further, the course will present the methods for complexity reduction, which considerably reduces development time. In addition, a strategy for developing a generator for automatic model derivation is also the part of this course.

MSCS 580 5G Mobile Communications

This course discusses some of the key concepts that will shape the next generations of mobile and wireless communications systems, i.e. 5G mobile radios. It is a study of wireless communication and the latest trends in advanced transmission, reception, coding, and cellular concepts that will shape 5G communication systems (including advanced air-interface, MIMO system, cooperation, antenna design, backhauling, vehicular technology). This course provides state-of-the-art knowledge regarding concept validation and prototyping.

MSCS 590 Introduction to Cryptography

This course provides an introduction to cryptography, its mathematical foundations, and its relation to security. It covers classical cryptosystems, private-key cryptosystems, hashing and public-key cryptosystems. This course also provides an introduction to data integrity and authentication.

MSCS 600 Artificial Intelligence: Principles and Techniques

This course is a study of the field of artificial intelligence that attempts to create computer programs reflecting the values of human intelligence. The course topics include state-space representations, tree and graph searches, predicate calculus and deduction, heuristics, learning and problem solving, natural language processing, expert systems, and programming languages for artificial intelligence.

MSCS 610 Embedded Software Programming

This courses covers the topics that include but are not limited to development environments for embedded software, resource aware programming, hardware programming, developing multi-threaded software, inter-process communication with shared memory and message passing, programming using real time operating systems, fault detection and testing, and fault tolerance and fault recovery.

Bible and Theology Requirements (2 Courses)

Student must choose two courses from the following:

BS 500 Introduction to Old Testament

Text, canon and examination of the foundation and conclusions of modern historical-critical methods; special introduction of each Old Testament book.

BS 501 Introduction to New Testament

The historical background of the New Testament including the formation, history, extent, and transmission of the canon. Includes a special introduction to each New Testament book.

BT 501 Contemporary Theology or Systematic Theology

Against the backdrop of philosophical development from the time of the Enlightenment, representative figures in theology are studied in order to grasp current hermeneutical methodologies and the development of biblical criticism.

Master of Science in Computer Information Systems

Sierra School of Computer Science in AEU

Master of Science in Computer Information Systems (MSCIS) Curriculum & Course Descriptions

(2 years program – 12 Courses*)

***1 Course is equivalent to 3 semester units or 4 quarter units**

General Description and Program Objective

The Master of Science in Computer Information Systems (MSCIS) program is designed for students with some experience in computer technology and planning who desire to advance their knowledge and skills in the area of the design, programming, and application of information technology systems. The emphasis is on providing students with the basic analytic skills and strong aptitude for security and IT project management. The program is also designed to help students to understand fundamental and important current issues in computer systems and information technologies. As such, the program is meant to provide students with opportunity to be prepared for employment or to pursue advanced degrees.

The program includes five (6) pre-determined core computer information systems major courses and five (4) elective courses. Every student in majoring MS in Computer Information Systems must take 5 major courses. The core computer information systems courses are as follows: Business Data Communication and Networks, Database Design and Implementation for Business, Information Systems Analysis and Design, IT Strategy and Management, and Information Structures with Java. And every student can select any 5 courses from the list of elective courses based on their interest or concentration in an attempt to prepare their employment or to advance their research. The elective courses have the following two major categories: Security and IT Project Management. Elective courses are as follows: Information Technology Project Management, Distributed Software Development and Management, Agile Software Development, IT Security Policies and Procedures, Enterprise Information Security, Database Security, Network Security, Digital Forensics and Investigations, Mobile Forensics, Web Application Development, Server-Side Web Development, and Rich Internet Application Development.

However, students can choose any class in any combination depending on their purpose in employment or interest in research. Every course has an emphasis on the concepts and techniques related to computer information systems. Students who do not have computer major in the bachelor program will be required to take 5 courses of prerequisite courses. There is a strong emphasis on biblical values and theological education. Courses in computer information systems major will be taught through the lenses of Christian principles.

Master of Science in Computer Information Systems Program sequence chart

Num	Courses
Prerequisite:	Non-computer major students must take 3 courses: MSCIS 300 Computer Programming; MSCIS 310 Computer Data Structure; MSCIS 320 Algorithms; MSCIS 330 Introduction to Information Structures; MSCIS 340 Introduction to Computer Communications
1 st term	MSCIS 400 Information Structures with Java MSCIS 430 Computer Communications MSCIS 450 Web Application Development MSCIS 470 Network Security MSCIS 570 IT Security Policies and Procedures MSCIS 510 Information Technology Project Management *Choose One Bible or Theology Course
2 nd term	MSCIS 410 Programming Languages MSCIS 440 Business Data Communication and Network MSCIS 460 Server-Side Web Development MSCIS 480 Enterprise Information Security MSCIS 520 Distributed Software Development and Management MSCIS 540 Database Security *Choose One Bible or Theology Course
3 rd term	MSCIS 420 Information Systems Analysis and Design MSCIS 430 Computer Communications

	<p>MSCIS 450 Web Application Development</p> <p>MSCIS 490 Database Design and Implementation for Business</p> <p>MSCIS 530 Agile Software Development</p> <p>MSCIS 550 Digital Forensics and Investigations</p> <p>*Choose One Bible or Theology Course</p>
4 th term	<p>MSCIS 400 Information Structures with Java</p> <p>MSCIS 440 Business Data Communication and Network</p> <p>MSCIS 460 Server-Side Web Development</p> <p>MSCIS 470 Network Security</p> <p>MSCIS 560 Mobile Forensics</p> <p>MSCIS 570 IT Security Policies and Procedures</p> <p>*Choose One Bible or Theology Course</p>
5 th term	<p>MSCIS 410 Programming Languages</p> <p>MSCIS 430 Computer Communications</p> <p>MSCIS 450 Web Application Development</p> <p>MSCIS 480 Enterprise Information Security</p> <p>MSCIS 580 Rich Internet Application Development</p> <p>MSCIS 540 Database Security</p> <p>*Choose One Bible or Theology Course</p>
6 th term	<p>MSCIS 420 Information Systems Analysis and Design</p> <p>MSCIS 440 Business Data Communication and Network</p> <p>MSCIS 460 Server-Side Web Development</p> <p>MSCIS 490 Database Design and Implementation for Business</p> <p>MSCIS 530 Agile Software Development</p> <p>MSCIS 500 IT Strategy and Management</p> <p>*Choose One Bible or Theology Course</p>

Course Descriptions

Prerequisite Courses for non-computer major students (5 courses)

MSCIS 300 Computer Programming

This course teaches fundamental concepts and terminology of computer programming. Students will develop skills in designing and writing simple computer programs. The course requires no programming background. This is a programming intensive course.

MSCIS 310 Computer Data Structure

This course covers fundamental data structures and algorithms using the Java programming language. This course will sharpen students' programming skills, and expand their knowledge of basic data structures and algorithms. The course extends object-oriented programming techniques to cover Java's API and data structures, such as hash tables, linked lists, stacks, queues, and binary trees, and provides an introduction to the analysis of algorithms that operate on those structures.

MSCIS 320 Algorithms

This course introduces students to the analysis and design of computer algorithms. This course helps student analyzing the asymptotic performance of algorithms, demonstrating knowledge of major algorithms and data structures, applying important algorithmic design paradigms and methods of analysis, and synthesizing efficient algorithms in common engineering design situations.

MSCIS 330 Introduction to Information Structures

This course covers the introduction to the object-oriented approach to software design and development in Python. It includes a detailed discussion of programming concepts starting with the fundamentals of data types, control structures methods, classes, interfaces, creating user interfaces, and exceptions. Upon completion of this course the students will be able to apply software engineering criteria to design and implement basic applications.

MSCIS 340 Introduction to Computer Communications

The course is the introduction to computer communication protocols. The primary emphasis is on conceptual issues in the design and implementation of computer internetworks.

Core/Major Courses in Computer Information Systems (6 of 10 courses)

MSCIS 400 Information Structures with Java

This course covers the concepts of object-oriented approach to software design and development using the Java programming language. It includes a detailed discussion of programming concepts starting with the fundamentals of data types, control structures methods, classes, applets, arrays and strings, and proceeding to advanced topics such as inheritance and polymorphism, interfaces, creating user interfaces, exceptions, and streams. Upon completion of this course the students will be able to apply software engineering criteria to design and implement Java applications that are secure, robust, and scalable.

MSCIS 410 Programming Languages

This course discusses the design, use, and implementation of imperative, object-oriented, and functional programming languages. The course also deals with scoping, type systems, control structures, functions, modules, object orientation, exception handling, and concurrency. A study also includes but is not limited to a variety of languages such as C++, Java, Ada, Lisp, and ML, and concepts that are reinforced by programming exercises.

MSCIS 420 Information Systems Analysis and Design

Object-oriented methods of information systems analysis and design for organizations with data- processing needs. System feasibility; requirements analysis; database utilization; Unified Modeling Language; software system architecture, design, and implementation, management; project control; and systems-level testing.

MSCIS 430 Computer Communications

The course is a study to computer communication protocols. The primary emphasis is on conceptual issues in the design and implementation of layered architecture of computer internetworks.

MSCIS 440 Business Data Communication and Network

This course presents the foundations of data communications and takes a bottom-up approach to computer networks. The course concludes with an overview of basic network security and management concepts.

MSCIS 450 Web Application Development

This course focuses on building core competencies in web design and development. It begins with a complete immersion into HTML essentially XHTML and Dynamic HTML (DHTML).

Students are exposed to Cascading Style Sheets (CSS), as well as Dynamic CSS. The fundamentals of JavaScript language including object-oriented JavaScript is covered comprehensively. AJAX with XML and JSON are covered, as they are the primary means to transfer data from client and server.

MSCIS 460 Server-Side Web Development

The Server-Side Web Development course concentrates primarily on building web applications using PHP/MySQL and Node.js/MongoDB. The course is divided into various modules covering in depth the following topics: PHP, MySQL, Object oriented PHP, PHP MVC, Secure Web applications, Node.js and MongoDB. Along with the fundamentals underlying these technologies, several applications will be showcased as case studies. Students work with these technologies starting with simple applications and then examining real world complex applications. At the end of this course, students would have mastered the web application development on the server-side.

MSCIS 470 Network Security

This course will cover advanced network security issues and solutions. The main focus on the first part of the course will be on Security basics, i.e. security services, access controls, vulnerabilities, threats and risk, network architectures and attacks. In the second part of the course, particular focus and emphasis will be given to network security capabilities and mechanisms (Access Control on wire-line and wireless networks), IPsec, Firewalls, Deep Packet Inspection and Transport security. The final portion of the course will address Network Application security (Email, Ad-hoc, XML/SAML and Services Oriented Architecture security). As part of our course review we will explore a number of Network Use Cases.

MSCIS 480 Enterprise Information Security

The course provides an in-depth presentation of security issues in computer systems, networks, and applications. Formal security models are presented and illustrated on operating system security aspects, more specifically memory protection, access control and authentication, file system security, backup and recovery management, intrusion and virus protection mechanisms. Application level security focuses on language level security and various security policies; conventional and public keys encryption, authentication, message digest and digital signatures. Internet and intranet topics include security in IP, routers, proxy servers, and firewalls, application- level gateways, Web servers, file and mail servers. Discussion of remote access issues, such as dial-up servers, modems, VPN gateways and

clients.

MSCIS 490 Database Design and Implementation for Business

Students learn the latest relational and object-relational tools and techniques for persistent data and object modeling and management. Students gain extensive hands-on experience using Oracle or Microsoft SQL Server as they learn the Structured Query Language (SQL) and design and implement databases.

Elective Courses in Computer Information Systems (4 Courses)

Students must choose five courses from the following Elective course listing:

MSCIS 500 IT Strategy and Management

This course describes and compares contemporary and emerging information technology and its management. Students learn how to identify information technologies of strategic value to their organizations and how to manage their implementation. The course highlights the application of I.T. to business needs.

MSCIS 510 Information Technology Project Management

This course provides students with a comprehensive overview of the principles, processes, and practices of software project management. Students learn techniques for planning, organizing, scheduling, and controlling software projects. There is substantial focus on software cost estimation and software risk management. Students will obtain practical project management skills and competencies related to the definition of a software project, establishment of project communications, managing project changes, and managing distributed software teams and projects.

MSCIS 520 Distributed Software Development and Management

Many of today's software systems are developed by geographically distributed teams. The course examines software engineering in this context, from the project and program management perspective. The term project consists of in-process submissions that are thoroughly reviewed, including among peers, together with a working system prototype.

MSCIS 530 Agile Software Development

This course provides students with a comprehensive overview of the principles, processes, and practices of agile software development. Students learn techniques for initiating, planning and executing on software development projects using agile methodologies. Students will obtain practical knowledge of agile development frameworks and be able to

distinguish between agile and traditional project management methodologies. Students will learn how to apply agile tools and techniques in the software development lifecycle from project ideation to deployment, including establishing an agile team environment, roles and responsibilities, communication and reporting methods, and embracing change.

MSCIS 540 Database Security

The course provides a strong foundation in database security and auditing. This course utilizes Oracle scenarios and step-by-step examples. The following topics are covered: security, profiles, password policies, privileges and roles, Virtual Private Databases, and auditing. The course also covers advanced topics such as SQL injection, database management security issues such as securing the DBMS, enforcing access controls, and related issues.

MSCIS 550 Digital Forensics and Investigations

This course provides a comprehensive understanding of digital forensics and investigation tools and techniques. The students learn what computer forensics and investigation is as a profession and gain an understanding of the overall investigative process. Operating system architectures and disk structures are discussed. The students study how to set up an investigator's office and laboratory, as well as what computer forensic hardware and software tools are available. Other topics covered include importance of digital evidence controls and how to process crime and incident scenes, details of data acquisition, computer forensic analysis, e-mail investigations, image file recovery, investigative report writing, and expert witness requirements. The course provides a range of laboratory and hands-on assignments either in solo or in teams. With rapid growth of computer systems and digital data this area has grown in importance.

MSCIS 560 Mobile Forensics

Overview of mobile forensics investigation techniques and tools. Topics include mobile forensics procedures and principles, related legal issues, mobile platform internals, bypassing passcode, rooting or jailbreaking process, logical and physical acquisition, data recovery and analysis, and reporting. Provides in-depth coverage of both iOS and Android platforms. Laboratory and hands-on exercises using current tools are provided and required.

MSCIS 570 IT Security Policies and Procedures

This course enables IT professional leaders to identify emerging security risks and implement highly secure networks to support organizational goals. Discussion of methodologies for identifying, quantifying, mitigating and controlling risks. Students implement a

comprehensive IT risk management plans (RMP) that identify alternate sites for processing mission-critical applications, and techniques to recover infrastructure, systems, networks, data and user access. The course also discusses related topics such as: disaster recovery, handling information security; protection of property, personnel and facilities; protection of sensitive and classified information, privacy issues, and criminal terrorist and hostile activities.

MSCIS 580 Rich Internet Application Development

The Rich Internet Application (RIA) Development course concentrates primarily on building rich client web applications in the browser for desktop and mobile devices. The course is divided into various modules covering in depth the following technologies: HTML5, jQuery UI & Mobile, and AngularJS. Along with the fundamentals underlying these technologies, several applications will be showcased as case studies. Students work with these technologies starting with simple applications and then examining real world complex applications. At the end of this course, students would have mastered the latest and widely used RIA methodologies.

Bible and Theology Requirements (2 Courses)

Student must choose two courses from the following:

BS 500 Introduction to Old Testament

Text, canon and examination of the foundation and conclusions of modern historical-critical methods; special introduction of each Old Testament book.

BS 501 Introduction to New Testament

The historical background of the New Testament including the formation, history, extent, and transmission of the canon. Includes a special introduction to each New Testament book.

BT 501 Contemporary Theology or Systematic Theology

Against the backdrop of philosophical development from the time of the Enlightenment, representative figures in theology are studied in order to grasp current hermeneutical methodologies and the development of biblical criticism.