



TEXAS A&M UNIVERSITY - SAN ANTONIO

Department of Computing & Cyber Security

Degree Programs and Certificates

2019-2020

<http://www.tamusa.edu/Computing-Cyber-Security/>



The Department of Computing and Cyber Security
College of Business
Texas A&M University-San Antonio, San Antonio, TX – 78224.
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The mission of the Department of Computing and Cyber Security (CCS) is to develop comprehensive computer science, cyber security and information systems education and research programs that will prepare students for professional careers and graduate studies; provide campus, community and experiential learning opportunities; and promote faculty and student research in the fields of computing, cyber security and information systems.

Degree Offerings - Fall 2019-20

1. Bachelors of Science in Computer Science (**BS-CS**) – Cyber Security concentration
2. Bachelors in Business Administration (**BBA-CIS**) Computer Information Systems (**CIS**) – General and Cyber Security concentration
3. Bachelors in Applied Arts and Sciences (**BAAS-IT**) – Information Technology – General and Cyber Security concentration
4. **NEW:** Bachelors of Science in Cyber Engineering Technology (**BS-CET**)
5. **NEW:** Masters of Science (**MS-CS**) in Computer Science with Cyber Security, Software Applications and Enterprise Systems concentrations.

ALL students graduating from the BS-CS, BBA-CIS, and the BAAS-IT programs with Cyber Security concentrations are eligible to get the NSA/DHS Cyber Defense Education Certificate upon graduation.

NSA/ DHS Cyber Defense Education-Required Courses

- CSCI 1336 Programming Fundamentals I + CSCI 1136 Lab
- MATH 1342 (or BUAD 3355) Introductory / Business Statistics
- CISA 2306 (or CSCI 4406) Computer Networks
- CISA 3351 (or CSCI 3304) Database Systems
- CISA 3309 Scripting Languages
- CISA 3321 (or CSCI 3321) Information Security
- CISA 3325 (or CSCI 4321) Network / Computer Security
- CISA 4323 Computer Forensics
- CISA 4324 Security Risk Analysis

Information in this document is for information only. Official university catalog, available through www.tamusa.edu, is applicable for all official purposes.

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The Department of Computing and Cyber Security

Degree Programs and Minor Requirements

MASTER OF SCIENCE IN COMPUTER SCIENCE (MSCS)

The objective of the Master of Science in Computer Science program (MSCS) is to prepare graduate students with the necessary knowledge and skill components in current computing and information systems, as required by business, government, and academia research. Specific current technology fields include courses in cyber security, mobile computing, big-data systems, cloud based systems, and enterprise systems. The program is designed to meet the needs of current working professionals, who want to get a graduate degree to stay abreast of the changing field of computing, as well as those with a recent bachelor's degree to advance their knowledge and skills for a career in computing and cyber security.

Admission Requirements

- *Students with an undergraduate major in computer science* with an average GPA of 3.0/4.0 or better on all prior advanced-level (junior, senior, and graduate) math and computer science related work taken from an accredited institution. Students below an average GPA of 3.0 but greater than 2.5 may be granted conditional admission.
- *Students with an undergraduate major in another discipline* who have taken the following “leveling” course work in math/computer science: MATH 2314 (Calculus II), CSCI 1337 (Programming Fundamentals II), CSCI 2325 (Computer Organization) and CSCI 2436 (Programming Fundamentals III) with associated laboratories. The student must attain a grade of “B” or better in the above courses and the laboratories. Students who have not completed these courses and have a 3.0 GPA or better in their major can be admitted on a conditional basis and take the courses at A&M-SA.
- *Students on conditional status must earn a grade of “B” or better* in all the leveling courses and the first 9 graduate hours courses attempted at A&M-SA. A conditional student who earns a grade of “C” or lower in the first 9 graduate hours or any of the leveling courses (and their associated laboratories) will be denied admission to the program.
- *A demonstrated proficiency in the use of the English language.* If a student's undergraduate degree is not from an accredited university in USA then the student must pass an English proficiency test such as TOEFL.
- *No more than six semester credit hours of graduate credit earned prior* to acceptance into the program, including transfer credit, may be applied to the MS degree.
- *Approval of the graduate advisor and department chair for all admissions.*

MSCS Degree Requirements

The MSCS degree can be completed by doing 36 hours of course work for non-thesis students or 30 hours of course work for thesis students. Required course (CSCI 5391 – Graduate Seminar, 3 credits) will be taken in the last semester before graduation where a non-thesis student will complete a major project and presentation to demonstrate the knowledge and skills required of a Masters level education in computer science. Required course (CSCI 5395) will be taken in the last two semesters (6 credit hours, 3 credits for each semester) before graduation where a thesis student will complete thesis and defense to demonstrate the thesis required of a Masters level education in computer science.

BACHELORS OF SCIENCE IN COMPUTER SCIENCE (BSCS)

<http://www.tamusa.edu/Computing-Cyber-Security/Computer-Science.html>

The ***Educational Objectives*** of the BSCS program are:

1. Graduates will acquire relevant marketable skills to be able to analyze and solve complex problems in the field of computing. (*linked to Student Outcomes 1 and 2*)
2. Graduates will demonstrate professional responsibilities and ethics and work collaboratively in a diverse environment. (*linked to Student Outcomes 3 and 4*)
3. Graduates will gain appropriate knowledge for working as computing professionals and/or for graduate studies. (*linked to Student Outcomes 5 and 6*)

Student Outcomes: Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Admission to BSCS program is based on the general university admissions requirements.

Additional requirements for graduation:

- 30 CSCI upper division courses required for this degree must be completed at A&M-SA to satisfy residency requirements
- Must complete at least 40 hours of major + major electives at A&M-SA.
- Must receive a grade of "C" or better in all MATH, CSCI and CISA core and their associated prerequisites for satisfactory passing grade
- A minimum average GPA of 2.25 must be maintained in all CISA and CSCI core and elective courses to remain in program. Applies to transfer courses also.
- Academic credits transferred as substitution courses must be completed within previous five years of admission to A&M-SA
- Approved upper-division CISA courses that can be used as electives for majors and minors are: CISA 3309, CISA 4323, CISA 4324, CISA 4332

BACHELORS OF BUSINESS ADMINISTRATION – COMPUTER INFORMATION SYSTEMS (BBA-CIS)

<http://www.tamusa.edu/Computing-Cyber-Security/computer-information-systems.html>

The BBA-CIS program follows all the requirements of the BBA program in the College of Business. Candidates for the **BBA–CIS Information Assurance (Cyber Security) concentration** must complete specific cyber security CISA/CSCI hours in residence for them to be eligible for the Cyber Defense Certificate.

The Learning Goals of the BBA-CIS program are:

- Students demonstrate usage of business computer applications.
- Students apply the concepts and techniques of information systems to business cases.
- Students select appropriate information system solutions for business problems.
- Students will be able to define the concepts of binomial and normal distribution in business.
- Students will be able to determine sampling distribution of the mean and sampling distribution of the proportion.
- Students will be able to perform a basic hypothesis test and interpret the results.

Admission to BBA-CIS program is based on the general university admissions requirements.

Additional requirements for graduation:

- 50 of the 60 hours listed under business core and major courses must be completed at A&M-SA
- Must receive a grade of “C” or better in all MATH, CSCI and CISA core and their associated prerequisites for satisfactory passing grade
- A minimum average GPA of 2.25 must be maintained in all business core and major courses to remain in program. Applies to transfer courses also.
- Academic credits transferred as substitution courses must be completed within previous five years of admission to A&M-SA

BACHELORS OF APPLIED ARTS AND SCIENCES - INFORMATION TECHNOLOGY (BAAS-IT)

<http://www.tamusa.edu/Computing-Cyber-Security/BAAS-Information-Technology.html>

The purpose of the Bachelor of Applied Arts and Sciences (B.A.A.S.) is to offer students with formal training in a vocational-technical studies area the opportunity to obtain a baccalaureate degree without the significant loss of credits that normally occurs when pursuing a traditional degree. This program is especially appropriate for graduates of an Associate of Applied Science program. The degree is designed to afford both academic and professional depth to individuals who possess recognized competence in an occupational or technical field. It is designed to offer flexibility that will permit tailoring the program to the student's background and educational objectives.

The student must complete a baccalaureate degree plan (120 semester hours minimum) consisting of 36 hours in residence and transfer credit which includes the following:

1. *General Education, Prerequisites and Electives (Minimum of 42 semester hours):* This component is made up of freshman and sophomore-level courses which meet each of the criteria identified by the university as important aspects of a general education listed in the General Education Requirements.
2. *Area of Specialization (18-42 semester hours):* Credits toward the area of specialization may be earned from regionally accredited junior or community colleges and vocational or technical schools; credits may also be earned through armed forces training when that work can be equated to college credit. Specialization hours must be completed prior to enrollment in a BAAS degree plan.
3. *Professional Development (36 semester hours):* The courses taken in this area are to be chosen to provide academic depth and breadth to the area of specialization and, in addition, afford substantive developmental knowledge in the student's professional career goals. The component focuses on areas of learning directly related to upward mobility and further extends a student's knowledge, skill and expertise. The professional development sequence of 36 semester hours CISA/CSCI courses. The professional sequence will be tailored to each student's needs.

Candidates for the BAAS–IT degree must complete a minimum of 36 CISA/CSCI hours in residence. Candidates for the **BAAS–IT Information Assurance (Cyber Security) concentration** must complete a minimum of 36 specific cyber security CISA/CSCI hours in residence for them to be eligible for the Cyber Defense Certificate.

Additional requirements for graduation:

- Must receive a grade of “C” or better in all MATH, CSCI and CISA core and their associated prerequisites for satisfactory passing grade
- A minimum average GPA of 2.25 must be maintained in all CISA and CSCI core and elective courses to remain in program. Applies to transfer courses also.
- Academic courses cannot be counted towards technical/ vocational credits
- Technical / vocational credits from non-approved colleges requires department head and Dean approval
- *Academic or technical / vocational courses must be completed within previous five years of admission to A&M-SA*

BACHELORS OF SCIENCE IN CYBER ENGINEERING TECHNOLOGY (BS-CETE)

<http://www.tamusa.edu/Computing-Cyber-Security/BS-Cyber-Engineering-Technology.html>

The objective of the Bachelor's Degree in Cyber Engineering Technology (BS –CETE) is to prepare undergraduate students with the necessary knowledge and skill components in current cyber related technologies, as required by business, government, and academia research. Specific current technology fields include courses in cyber security, cloud based technologies, embedded and mobile technologies, and internet-of-things (IoT) technologies. The program is designed to meet the needs of current high school students as well as working professionals, who want to get an applied degree in cyber related technologies to meet the demands of the changing field of cyber technologies. It will also cater to students who have a two year associate's degree from the various community colleges, to get a recognized bachelor's degree in a field where there is a tremendous need for such professionals which is aligned with the university strategic plan and the state's 60x30TX plan which encourages increasing enrollment of the students to obtain Bachelor's degree.

The program not only has a substantial part of the curricula focusing directly on cyber security, it also benefits from the cyber security modules that bridge across all information and computer technology courses offered by A&M-SA. Furthermore, it provides for 12 hours of business courses so that graduates learn how to work with teams and co-workers.

Admission to BS-CETE program is based on the general university admissions requirements.

Minor in Computer Information Systems (Available only to non-business majors):

The following courses are required: CISA 1305 (Business Computer Applications), CSCI 1336 (Programming Fundamentals I), CSCI 1136 (Programming Fundamentals I Lab), CISA 3356 (Database Design and SQL), CISA 3358 (Management Information Systems), and four approved advanced CISA courses.

Minor in Computer Science (Available to any major): The computer science minor consists of the following required courses (18 hours):

- CSCI 1136 Programming Fundamentals I Lab
- CSCI 1137 Programming Fundamentals II Lab
- CSCI 1336 Programming Fundamentals I
- CSCI 1337 Programming Fundamentals II
- CSCI 2436 Programming Fundamentals III
- CSCI 3304 Database systems
- 3 Additional semester credit hours from an upper-division CSCI course or approved CISA elective

Computer Information Systems and Computer Science

Program Certificates

cybersec@tamusa.edu

<http://www.tamusa.edu/Computing-Cyber-Security/Center-for-Information-Technology-Cyber-Security.html>

NSA / DHS Cyber Defense Program Certificate

TAMU-SA is designated as the National Center for Academic Excellence by NSA/DHS. The curriculum below is certified by the Cyber Defense (CD) Program.

To receive the CD certificate, students must complete the following courses with a grade of C or better in each:

- CSCI 1336 Programming Fundamentals I + CSCI 1136 Lab
- MATH 1342 (or BUAD 3355) Introductory Statistics
- CISA 2306 (or CSCI 4406) Computer Networks
- CISA 3351 (or CSCI 3304) Database Systems
- CISA 3309 Scripting Languages
- CISA 3321 (or CSCI 3321) Information Security
- CISA 3325 (or CSCI 4321) Network Security
- CISA 4323 Computer Forensics
- CISA 4324 Security Risk Analysis

Students who complete all required courses may contact Dr. Kevin Barton Kevin.Barton@tamusa.edu to request a printed certificate.

TAMUSA Cyber Security Certificates

The Computing and Cyber Security Department offers students the opportunity to gain marketable certificates in Cyber Security. Any undergraduate student enrolled at Texas A&M University-San Antonio and can count as electives according to degree plan requirements can take the courses for these certificates. All certificates will only be awarded in conjunction with a baccalaureate degree.

The Cyber Security Certificate includes the following five courses (13 SCH):

- CSCI 1336 Programming Fundamentals I (3 hours)
- CSCI 1136 Programming Fundamentals I Laboratory (1 hour)
- CSCI 3321 Cyber Security or CISA 332 Information Security (3 hours)
- CISA 2306 Computer Networks (3 hours)
- CISA 4322 (Information Policy Assurance) or CISA 4323 (Computer Forensics) or CISA 4324 (Security Risk Analysis) (3 hours)

Computer Science Bachelors Degree

A&M-SA BS Computer Science Program (2019-20 Catalog, Total 120 hours)

Plan for High School (4-Year Plan) or Transfer Students. Highlighted courses may be taken at a Community College.

Freshman Year

| Fall Semester | | Hr | Spring Semester | | Hr |
|---------------|---|-----------|-----------------------|---|-----------|
| ENGL 1301 | Composition I - Prereq: TSI R | 3 | ENGL 1302 / ENGL 2311 | Composition II (or Tech Writing) - Prereq: ENGL 1301 | 3 |
| MATH 2313 | Calculus I - Prereq: MATH 2312 | 3 | MATH 2314 | Calculus II - Prereq: MATH 2313 | 3 |
| MATH 2113 | Calculus I Lab - CoReq: MATH 2313 | 1 | MATH 2114 | Calculus II Lab - Coreq: MATH 2314 | 1 |
| CSCI 1336 | Programming Fundamentals I - Prereq: MATH 1314 or equi, Coreq: CSCI 1136 | 3 | CSCI 1337 | Programming Fundamentals II - Prereq: CSCI 1336, CSCI 1136, Coreq: CSCI 1137 | 3 |
| CSCI 1136 | Programming Fundamentals I Lab - Prereq: MATH 1314 or equi, Coreq: CSCI 1336 | 1 | CSCI 1137 | Programming Fundamentals II Lab - Prereq: CSCI 1336, CSCI 1136, Coreq: CSCI 1337 | 1 |
| HIST 1301 | US History to 1865 - Prereq: TSI | 3 | | Science Course I | 3 |
| UNIV 1101 | JagTracks I | 1 | | Science Course I Lab | 1 |
| Total | | 15 | Total | | 15 |

Sophomore Year

| Fall Semester | | Hr | Spring Semester | | Hr |
|---------------|---|-----------|-----------------|--|-----------|
| GOVT 2305 | Federal Government - Prereq: TSI R | 3 | GOVT 2306 | Texas Government - Prereq: TSI R | 3 |
| MATH 1342 | Intro Statistics - Prereq: TSI M, Coreq: MATH 1042 | 3 | | Science Course II | 3 |
| MATH 1042 | Intro Statistics Recitation - Coreq: MATH 1342 | 0 | | Science Course II Lab | 1 |
| HIST 1302 | US History from 1865 - Prereq: TSI | 3 | CSCI 2322 | Discrete Structures for Computing - Prereq: CSCI 1137, 1337 | 3 |
| CSCI 2325 | Computer Organization - Prereq: CSCI 1137, 1337 | 3 | UNIV 2101 | JagTracks II | 1 |
| CSCI 2436 | Prog Fundamentals III - Prereq: CSCI 1137, 1337 | 4 | | Creative Arts - Univ Arts Core | 3 |
| | | | | Lang/Phil/Culture - Univ Lang Core | 3 |
| Total | | 16 | Total | | 17 |

Junior Year

| Fall Semester | | Hr | Spring Semester | | Hr |
|---------------|---|-----------|-----------------------|--|-----------|
| MATH 3340 | Linear Algebra - MATH 2313, MATH 2113 (or MATH 2413) | 3 | CSCI 3321 / CISA 3321 | Cyber Security - Prereq: CSCI 1137, CSCI 1337, and (CSCI 2436 or CISA 3309) or Info Security | 3 |
| CSCI 3304 | Database Systems - Prereq: CSCI 2436 | 3 | CSCI 3343 | Algorithms - Prereq: CSCI 2436, MATH 2314, MATH 2114 | 3 |
| CSCI 3366 | Programming Languages - Prereq: CSCI 2322, CSCI 2436 | 3 | CSCI 3344 | Computer Architecture - Prereq: CSCI 2325 | 3 |
| CSCI 3101 | JagTracks III | 1 | CSCI 3362 | Operating Systems - Prereq: CSCI 2325, CSCI 2436 | 3 |
| | Social & Behv Sci | 3 | | Upper-Division CSCI Elective or Approved CISA Elective | 3 |
| | Upper-Division CSCI Elective or Approved CISA Elective | 3 | | | |
| Total | | 16 | Total | | 15 |

Senior Year

| Fall Semester | | Hr | Spring Semester | | Hr |
|---------------|--|-----------|-----------------|--|-----------|
| CSCI 4406 | Computer Networks - Prereq: Math 3340, CSCI 2436, CSCI 3321 | 4 | CSCI 4391 | Senior Seminar - Prereq: CSCI 4316 | 3 |
| CSCI 4316 | Software Engineering I - Prereq: CSCI 2436 | 3 | CSCI 4321 | Computer Security - Prereq: Math 3340, CSCI 2436, CSCI 4406 | 3 |
| | Upper-Division CSCI Elective or Approved CISA Elective | 3 | CSCI 4317 | Software Engineering II - Prereq: CSCI 4316 | 3 |
| | Upper-Division CSCI Elective or Approved CISA Elective | 3 | | Upper-Division CSCI Elective or Approved CISA Elective | 3 |
| CSCI 4101 | JagTracks IV | 1 | | | |
| Total | | 14 | Total | | 12 |

- Notes:** (i): Students completing NSA Cyber Certificate must take following electives: CISA 3309, CISA 4323, CISA 4324
- (ii): Students not completing NSA Cyber Certificate can take Approved CSCI/CISA upper level courses as Electives
- (iii): Science Course I,II+Lab: (BIOL 1306,1106,1307,1107), (CHEM 1311,1111,1312,1112), (GEOL 1301,1101,1302,1102), (PHYS 1301,1101,1302,1102), (PHYS 2325,2125,2326,2126)
- (iv): For transfer students, 40 hours of Major courses + Major electives from A&M-SA are required
- (v): See Official University Catalog for all applicable requirements

Bachelor of Science in Computer Science 2019-2020 Degree Plan

| CORE CURRICULUM (See note below) | | 42 SCH | |
|---|------------|---------------|--|
| | Grd | SCH | |
| (010) COMMUNICATION | | | |
| ENGL 1301 Composition I | | 3 | |
| ENGL 1302 Composition II or ENGL 2311 Technical Writing | | 3 | |
| (020) MATHEMATICS | | | |
| MATH 2313 Calculus I | | 3 | |
| (030) LIFE AND PHYSICAL SCIENCES | | | |
| BIOL 1306 or CHEM 1311 or GEOL 1301 or PHYS 1301, or PHYS 2325 | | 3 | |
| BIOL 1307 or CHEM 1312 or GEOL 1302 or PHYS 1302, or PHYS 2326 | | 3 | |
| (040) LANGUAGE, PHILOSOPHY, AND CULTURE | | | |
| Language/Philosophy/Culture | | 3 | |
| (050) CREATIVE ARTS | | | |
| Creative Arts | | 3 | |
| (060) AMERICAN HISTORY | | | |
| American History | | 3 | |
| American History | | 3 | |
| (070) GOVERNMENT / POLITICAL SCIENCE | | | |
| Government / Political Science | | 3 | |
| Government / Political Science | | 3 | |
| (080) SOCIAL AND BEHAVIORAL SCIENCE | | | |
| Social and Behavioral Science | | 3 | |
| (090) COMPONENT AREA OPTION | | | |
| MATH 2414 Calculus II | | 3 | |
| MATH 1342 Introductory Statistics | | 3 | |
| MATH 1042 Introductory Statistics Recitation | | 0 | |
| Departmental Requirements | | 7 SCH | |
| | Grd | SCH | |
| BIOL 1106 or CHEM 1111 or GEOL 1101 or PHYS 1101, or PHYS 2125 | | 1 | |
| BIOL 1107 or CHEM 1112 or GEOL 1102 or PHYS 1102, or PHYS 2126 | | 1 | |
| MATH 2113 Calculus I Lab | | 1 | |
| MATH 2114 Calculus II Lab | | 1 | |
| MATH 3340 Linear Algebra | | 3 | |
| UNIVERSITY REQUIREMENTS | | 4 SCH | |
| | Grd | SCH | |
| UNIV 1101 Jaguar Tracks I | | 1 | |
| UNIV 2101 Jaguar Tracks II | | 1 | |
| CSCI 3101 Jaguar Tracks III Computer Science | | 1 | |
| CSCI 4101 Jaguar Tracks IV Computer Science | | 1 | |

Note about core curriculum courses: Other courses may satisfy core curriculum requirements. Courses listed under the core curriculum above are also specific degree requirements, and are recommended in the core to expedite degree completion.

| Required Support Courses | | 18 SCH | |
|---|-----------|---------------|--|
| | Gr | SCH | |
| CSCI 1136 Programming Fundamentals I Lab | | 1 | |
| CSCI 1137 Programming Fundamentals II Lab | | 1 | |
| CSCI 1336 Programming Fundamentals I | | 3 | |
| CSCI 1337 Programming Fundamentals II | | 3 | |
| CSCI 2436 Programming Fundamentals III | | 4 | |
| CSCI 2322 Discrete Structures for Computing | | 3 | |
| CSCI 2325 Computer Organization | | 3 | |
| | | | |
| Major Courses | | 34 SCH | |
| CSCI 3304 Database Systems | | 3 | |
| CSCI 3321 Cyber Security or CISA 3321 Information Security | | 3 | |
| CSCI 3343 Algorithms | | 3 | |
| CSCI 3344 Computer Architecture | | 3 | |
| CSCI 3362 Operating Systems | | 3 | |
| CSCI 3366 Programming Languages | | 3 | |
| CSCI 4406 Computer Networks | | 4 | |
| CSCI 4316 Software Engineering I | | 3 | |
| CSCI 4317 Software Engineering II | | 3 | |
| CSCI 4321 Computer Security | | 3 | |
| CSCI 4391 Senior Seminar | | 3 | |
| Major Electives | | 15 SCH | |
| Upper-Division CSCI Elective or Approved CISA Elective | | 3 | |
| Upper-Division CSCI Elective or Approved CISA Elective | | 3 | |
| Upper-Division CSCI Elective or Approved CISA Elective | | 3 | |
| Upper-Division CSCI Elective or Approved CISA Elective | | 3 | |
| Upper-Division CSCI Elective or Approved CISA Elective | | 3 | |
| | | | |
| Computer Science Minor (Optional for any Major) | | 18 SCH | |
| CSCI 1136 Programming Fundamentals I Lab | | 1 | |
| CSCI 1137 Programming Fundamentals II Lab | | 1 | |
| CSCI 1336 Programming Fundamentals I | | 3 | |
| CSCI 1337 Programming Fundamentals II | | 3 | |
| CSCI 2436 Programming Fundamentals III | | 4 | |
| CSCI 3304 Database Systems | | 3 | |
| Upper-Division CSCI Course or Approved CISA Elective | | 3 | |

120 CREDIT HOURS REQUIRED FOR DEGREE

- 30 CSCI UPPER-DIVISION HOURS REQUIRED FOR THIS DEGREE MUST BE COMPLETED AT A&M-SA TO SATISFY RESIDENCY REQUIREMENT
- MUST COMPLETE AT LEAST 40 HOURS OF MAJOR COURSES+ MAJOR ELECTIVES AT A&M-SA.
- MUST RECEIVE A GRADE OF "C" OR BETTER IN ALL MATH, CSCI, AND CISA COURSES AND THEIR ASSOCIATED PREREQUISITES FOR SATISFACTORY PASSING GRADE. A MINIMUM AVERAGE GPA OF 2.25 MUST BE MAINTAINED IN ALL CSCI & CISA CORE AND ELECTIVE COURSES TO REMAIN IN PROGRAM. APPLIES TO TRANSFER COURSES ALSO.
- ACADEMIC CREDITS TRANSFERRED AS SUBSTITUTION COURSES MUST BE COMPLETED WITHIN PREVIOUS FIVE YEARS OF ADMISSION TO A&M-SA.
- APPROVED UPPER-DIVISION CISA COURSES THAT CAN BE USED AS ELECTIVES FOR MAJORS AND MINORS ARE: CISA 3309, CISA 4323, CISA 4324, CISA 4332.

BBA Computer Information Systems- Cyber Security Concentration- Bachelors Degree

A&M-SA BBA CIS - Cyber Security Program (2019-20 Catalog, Total 120 hours)

Plan for High School (4-Year Plan) or Transfer Students. Highlighted Courses can be taken at a Community College.

Freshman Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|------------------|--|-----------|-----------------|--|-----------|
| ENGL 1301 | Composition I - Prereq: TSI R | 3 | ENGL 1302 | Composition II - Prereq: ENGL 1301 | 3 |
| HIST 1301 | US History to 1865 - Prereq: TSI | 3 | HIST 1302 | US History since 1865 - Prereq: TSI | 3 |
| | Science Course I, Univ Sci Core | 3 | | Science Course II | 3 |
| MATH 1314 / 1324 | College Algebra/Mathematics for Business and Social Sciences I | 3 | CSCI 1336 | Programming Fundamentals I - Prereq: MATH 1314 or equivalent | 3 |
| SPCH 1315 | Fundamentals of Public Speaking | 3 | | Creative Arts | 3 |
| UNIV 1101 | JagTracks 1 | 1 | | | |
| Total | | 16 | Total | | 15 |

Sophomore Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|--|-----------|-----------------|--|-----------|
| GOVT 2305 | Federal Government - Prereq: TSI R | 3 | GOVT 2306 | Texas Government - Prereq: TSI R | 3 |
| ACCT 2301 | Princ of Financial Acct | 3 | ACCT 2302 | Princ of Managerial Acct | 3 |
| CSCI 1337 | Programming Fundamentals II - Prereq: CSCI 1336, CSCI 1136 | 3 | ECON 2302 | Macroeconomics | 3 |
| CSCI 1137 | Programming Fundamentals II Lab - Prereq: CSCI 1336, CSCI 1136, Coreq: CSCI 1337 | 1 | BUAD 2360 | Business Statistics 1 - Prereq: MATH 1314 or 1324, CISA 1305/1405 or CSCI 1336 and CSCI 1136 | 3 |
| | Lang/Phil/Culture | 3 | BUAD 2301 | Quantitative skills for business - Prereq: MATH 1325 | 3 |
| ECON 2301 | Microeconomics | 3 | UNIV 2101 | JagTracks II | 1 |
| Total | | 16 | Total | | 16 |

Junior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|--|-----------|-----------------|---|-----------|
| ACCT 3301 | Acct for non-Acct Majors - Prereq: ACCT 2301 and ACCT 2302 or equivalent | 3 | FINC 3337 | Business Finance - Prereq: BUAD 2301 | 3 |
| BCOM 3304 | Business Communications - Prereq: ENGL 1301 and ENG 1302 | 3 | CISA 3356 | Systems Analysis and Design | 3 |
| BUAD 3360 | Business Statistics 2 - Prereq: BUAD 2360 | 3 | MGMT 3311 | Principles of Management - Prereq: ENGL 1301 and ENG 1302 | 3 |
| CISA 2306 | Computer Networks - Prereq: MATH 1314 | 3 | MKTG 3311 | Principles of Marketing - Prereq: ENGL 1301 and ENG 1302 | 3 |
| CISA 3309 | Scripting Languages - Prereq: CSCI 1337, CSCI 1137 | 3 | BLAW 3341 | Business Law- Prereq: ENGL 1301 and ENG 1302 | 3 |
| CSCI 3101 | JagTracks 3 | 1 | | | |
| Total | | 16 | Total | | 15 |

Senior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|--|-----------|-----------------|---|-----------|
| MGMT 3320 | Supply Chain and Ops Mgmt | 3 | CISA 4326 | Security & Operation Project - Prereq: CISA 4324 or CISA 4325 | 3 |
| CISA 3351 | Database Design and SQL - Prereq: CSCI 1336, CSCI 1136 | 3 | MGMT 4370 | Decision and Business Policy | 3 |
| CISA 3321 | Information Security - Prereq: CISA 2306 | 3 | BUAD 4170 | Decision and Business Policy Lab | 1 |
| CISA 3325 | Network Security - Prereq: CISA 2306 or CSCI 4406 and CSCI 3321 or CSCI 3321 | 3 | CISA 4323 | Computer Forensics - Prereq: CISA 2306, CISA 3321 | 3 |
| CSCI 4101 | JagTracks 4 | 1 | CISA 4324 | Security Risk Analysis - Prereq: CISA 2306, CISA 3321 | 3 |
| Total | | 13 | Total | | 13 |

Notes: (i): Students successfully completing this program are eligible to get the NSA Cyber Education Certificate

(ii): For transfer students, 40 hours of Major courses + Major electives from A&M-SA are required

(iii): See Official University Catalog for all applicable requirements

Bachelor Business Administration in Computer Information Systems
Information Assurance and Security Concentration
2019-2020 Degree Plan

| CORE CURRICULUM (See note below) | | 42 SCH | |
|--|------------|---------------|--|
| | Grd | SCH | |
| (010) COMMUNICATION | | | |
| ENGL 1301 Composition I | | 3 | |
| ENGL 1302 Composition II | | 3 | |
| (020) MATHEMATICS | | | |
| MATH 1314 or MATH 1324 | | 3 | |
| (030) LIFE AND PHYSICAL SCIENCE | | | |
| Life & Physical Science | | 3 | |
| Life & Physical Science | | 3 | |
| (040) LANGUAGE, PHILOSOPHY, AND CULTURE | | | |
| Language/Philosophy/Culture | | 3 | |
| (050) CREATIVE ARTS | | | |
| Creative Arts | | 3 | |
| (060) AMERICAN HISTORY | | | |
| American History | | 3 | |
| American History | | 3 | |
| (070) GOVERNMENT/POLITICAL SCIENCE | | | |
| Government / Political Science | | 3 | |
| Government / Political Science | | 3 | |
| (080) SOCIAL AND BEHAVIORAL SCIENCE | | | |
| ECON 2301 Macroeconomics | | 3 | |
| (090) COMPONENT AREA OPTION | | | |
| SPCH 1315 Fundamentals of Public Speaking | | 3 | |
| ECON 2302 Microeconomics | | 3 | |
| REQUIRED SUPPORT COURSES | | 12 SCH | |
| | Grd | SCH | |
| BUAD 2305 Business Statistics 1 | | 3 | |
| ACCT 2301 Principles of Financial Acct | | 3 | |
| ACCT 2302 Principles of Managerial Acct | | 3 | |
| CSCI 1336 Programming Fundamentals I | | 3 | |
| UNIVERSITY REQUIREMENTS | | 4 SCH | |
| | Grd | SCH | |
| UNIV 1101 Jaguar Tracks I | | 1 | |
| UNIV 2101 Jaguar Tracks II | | 1 | |
| CISA 3101 Jaguar Tracks III Computer Information Sys | | 1 | |
| CISA 4101 Jaguar Tracks IV Computer Information Sys | | 1 | |

| Business Core (Upper Level) | | 34 SCH | |
|---|------------|---------------|--|
| 2.0 overall GPA for major | | | |
| | Grd | SCH | |
| ACCT 3301 Acct for non-Acct Majors | | 3 | |
| BCOM 3304 Business Communications | | 3 | |
| BLAW 3341 Business Law | | 3 | |
| BUAD 2310 Quantitative Skills for Business | | 3 | |
| BUAD 3360 Business Statistics 2 | | 3 | |
| CISA 3356 Systems Analysis and Design | | 3 | |
| FINC 3337 Business Finance | | 3 | |
| MGMT 3311 Principles of Management | | 3 | |
| MGMT 3320 Supply Chain and Ops Management | | 3 | |
| MKTG 3311 Principles of Marketing | | 3 | |
| BUAD 4170 Business Capstone Lab | | 1 | |
| MGMT 4370 MGMT Decision and Business Policy (to be completed in your last semester only) ** | | 3 | |
| Major Courses | | 27 SCH | |
| | Grd | SCH | |
| CISA 3351 Database and Design and SQL | | 3 | |
| CSCI 1337 Programming Fundamentals II | | 3 | |
| CISA 3309 Scripting Languages | | 3 | |
| CISA 4326: Security & Ops Practicum | | 3 | |
| CISA 3321 Information Security | | 3 | |
| Concentration Requirements | | 12 SCH | |
| CISA 4323 Computer Forensics | | 3 | |
| CISA 4324 Security Risk Analysis | | 3 | |
| CISA 2306 Computer Networks | | 3 | |
| CISA 4325 Network Security | | 3 | |
| ELECTIVES | | | |
| | | 1 SCH | |
| | GRD | SCH | |
| CSCI 1137 Programming Fundamentals II Lab | | 1 | |

120 CREDIT HOURS REQUIRED FOR DEGREE

Note about core curriculum courses: Other courses may satisfy core curriculum requirements. Courses listed under the core curriculum above are also specific degree requirements, and are recommended in the core to expedite degree completion.

- 50 OF THE 60 HOURS LISTED UNDER BUSINESS CORE AND MAJOR COURSES MUST BE COMPLETED AT A&M –SA.
- MUST RECEIVE A GRADE OF “C” OR BETTER IN ALL MATH, CSCI, AND CISA COURSES AND THEIR ASSOCIATED PREREQUISITES FOR SATISFACTORY PASSING GRADE. A MINIMUM AVERAGE GPA of 2.25 MUST BE MAINTAINED IN ALL BUSINESS CORE AND MAJOR COURSES TO REMAIN IN PROGRAM. APPLIES TO TRANSFER COURSES ALSO.
- ACADEMIC CREDITS TRANSFERRED AS SUBSTITUTION COURSES MUST BE COMPLETED WITHIN PREVIOUS FIVE YEARS OF ADMISSION TO A&M-SA.

BBA Computer Information Systems - Bachelors Degree

A&M-SA BBA CIS - General Program (2019-20 Catalog, Total 120 hours)

Plan for High School (4-Year Plan) or Transfer Students. Highlighted Courses can be taken at a Community College.

Freshman Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|------------------|---|-----------|-----------------|---|-----------|
| ENGL 1301 | <i>Composition I - Prereq: TSI R</i> | 3 | ENGL 1302 | <i>Composition II - Prereq: ENGL 1301</i> | 3 |
| HIST 1301 | <i>US History to 1865 - Prereq: TSI</i> | 3 | HIST 1302 | <i>US History since 1865 - Prereq: TSI</i> | 3 |
| | <i>Science Course I, Univ Sci Core</i> | 3 | | <i>Science Course II</i> | 3 |
| MATH 1314 / 1324 | <i>College Algebra/Mathematics for Business and Social Sciences I</i> | 3 | CSCI 1336 | <i>Programming Fundamentals I - Prereq: MATH 1314 or equivalent</i> | 3 |
| SPCH 1315 | <i>Fundamentals of Public Speaking</i> | 3 | | <i>Creative Arts</i> | 3 |
| UNIV 1101 | <i>JagTracks 1</i> | 1 | | | |
| Total | | 16 | Total | | 15 |

Sophomore Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|---|-----------|
| GOVT 2305 | <i>Federal Government - Prereq: TSI R</i> | 3 | GOVT 2306 | <i>Texas Government - Prereq: TSI R</i> | 3 |
| ACCT 2301 | <i>Princ of Financial Acct</i> | 3 | ACCT 2302 | <i>Princ of Managerial Acct</i> | 3 |
| CSCI 1337 | <i>Programming Fundamentals II - Prereq: CSCI 1336, CSCI 1136</i> | 3 | ECON 2302 | <i>Macroeconomics</i> | 3 |
| CSCI 1137 | <i>Programming Fundamentals II Lab - Prereq: CSCI 1336, CSCI 1136, Coreq: CSCI 1337</i> | 1 | BUAD 2360 | <i>Business Statistics 1 - Prereq: MATH 1314 or 1324, CISA 1305/1405 or CSCI 1336 and CSCI 1136</i> | 3 |
| | <i>Lang/Phil/Culture</i> | 3 | BUAD 2301 | <i>Quantitative skills for business - Prereq: MATH 1325</i> | 3 |
| ECON 2301 | <i>Microeconomics</i> | 3 | UNIV 2101 | <i>JagTracks II</i> | 1 |
| Total | | 16 | Total | | 16 |

Junior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|--|-----------|
| ACCT 3301 | <i>Acct for non-Acct Majors - Prereq: ACCT 2301 and ACCT 2302 or equivalent</i> | 3 | FINC 3337 | <i>Business Finance - Prereq: BUAD 2301</i> | 3 |
| BCOM 3304 | <i>Business Communications - Prereq: ENGL 1301 and ENG 1302</i> | 3 | CISA 3356 | <i>Systems Analysis and Design</i> | 3 |
| BUAD 3360 | <i>Business Statistics 2 - Prereq: BUAD 2360</i> | 3 | MGMT 3311 | <i>Principles of Management - Prereq: ENGL 1301 and ENG 1302</i> | 3 |
| CISA 2306 | <i>Computer Networks - Prereq: MATH 1314</i> | 3 | MKTG 3311 | <i>Principles of Marketing - Prereq: ENGL 1301 and ENG 1302</i> | 3 |
| CISA 3309 | <i>Scripting Languages - Prereq: CSCI 1337, CSCI 1137</i> | 3 | BLAW 3341 | <i>Business Law - Prereq: ENGL 1301 and ENG 1302</i> | 3 |
| CSCI 3101 | <i>JagTracks 3</i> | 1 | | | |
| Total | | 16 | Total | | 15 |

Senior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|--|-----------|
| MGMT 3320 | <i>Supply Chain and Ops Mgmt</i> | 3 | CISA 4358 | <i>Senior Project & Seminar - Prereq: CISA 3351, CISA 3356</i> | 3 |
| CISA 3351 | <i>Database Design and SQL - Prereq: CSCI 1336, CSCI 1136</i> | 3 | MGMT 4370 | <i>Decision and Business Policy</i> | 3 |
| CISA 3321 | <i>Information Security - Prereq: CISA 2306</i> | 3 | BUAD 4170 | <i>Decision and Business Policy Lab</i> | 1 |
| | <i>CISA/Business Elective</i> | 3 | | <i>Upper Division CISA/CSCI Elective</i> | 3 |
| CSCI 4101 | <i>JagTracks 4</i> | 1 | | <i>Upper Division CISA/CSCI Elective</i> | 3 |
| Total | | 13 | Total | | 13 |

Notes: (i): For transfer students, 40 hours of Major courses + Major electives from A&M-SA are required

(ii): See Official University Catalog for all applicable requirements

Bachelor Business Administration in Computer Information Systems
2019-2020 Degree Plan

| CORE CURRICULUM (See note below) | 42 SCH | |
|--|---------------|---------------|
| | Grd | SCH |
| (010) COMMUNICATION | | |
| ENGL 1301 Composition I | | 3 |
| ENGL 1302 Composition II | | 3 |
| (020) MATHEMATICS | | |
| MATH 1314 or MATH 1324 | | 3 |
| (030) LIFE AND PHYSICAL SCIENCE | | |
| Life & Physical Science | | 3 |
| Life & Physical Science | | 3 |
| (040) LANGUAGE, PHILOSOPHY, AND CULTURE | | |
| Language/Philosophy/Culture | | 3 |
| (050) CREATIVE ARTS | | |
| Creative Arts | | 3 |
| (060) AMERICAN HISTORY | | |
| American History | | 3 |
| American History | | 3 |
| (070) GOVERNMENT/POLITICAL SCIENCE | | |
| Government / Political Science | | 3 |
| Government / Political Science | | 3 |
| (080) SOCIAL AND BEHAVIORAL SCIENCE | | |
| ECON 2301 Macroeconomics | | 3 |
| (090) COMPONENT AREA OPTION | | |
| SPCH 1315 Fundamentals of Public Speaking | | 3 |
| ECON 2302 Microeconomics | | 3 |
| REQUIRED SUPPORT COURSES | | |
| | | 12 SCH |
| | Grd | SCH |
| BUAD 2305 Business Statistics 1 | | 3 |
| ACCT 2301 Principles of Financial Acct | | 3 |
| ACCT 2302 Principles of Managerial Acct | | 3 |
| CSCI 1336 Programming Fundamentals I | | 3 |
| UNIVERSITY REQUIREMENTS | | |
| | | 4 SCH |
| | Grd | SCH |
| UNIV 1101 Jaguar Tracks I | | 1 |
| UNIV 2101 Jaguar Tracks II | | 1 |
| CISA 3101 Jaguar Tracks III Computer Information Sys | | 1 |
| CISA 4101 Jaguar Tracks IV Computer Information Sys | | 1 |

Note about core curriculum courses: Other courses may satisfy core curriculum requirements. Courses listed under the core curriculum above are also specific degree requirements, and are recommended in the core to expedite degree completion.

| Business Core (Upper Level) | 34 SCH | |
|---|---------------|---------------|
| 2.0 overall GPA for major | Grd | SCH |
| ACCT 3301 Acct for non-Acct Majors | | 3 |
| BCOM 3304 Business Communications | | 3 |
| BLAW 3341 Business Law | | 3 |
| BUAD 2310 Quantitative Skills for Business | | 3 |
| BUAD 3360 Business Statistics 2 | | 3 |
| CISA 3356 Systems Analysis and Design | | 3 |
| FINC 3337 Business Finance | | 3 |
| MGMT 3311 Principles of Management | | 3 |
| MGMT 3320 Supply Chain and Ops Mgmt | | 3 |
| MKTG 3311 Principles of Marketing | | 3 |
| BUAD 4170 Business Capstone Lab | | 1 |
| MGMT 4370 MGMT Decision and Business Policy (to be completed in your last semester only) ** | | 3 |
| Major Courses | | |
| | | 27 SCH |
| | Grd | SCH |
| CISA 3351 Database and Design and SQL | | 3 |
| CSCI 1337 Programming Fundamentals II | | 3 |
| CISA 3309 Scripting Languages | | 3 |
| CISA 2306 Computer Networks I | | 3 |
| CISA 4358 Senior Seminar & Project | | 3 |
| CISA 3321 Information Security | | 3 |
| Major Electives | | |
| | | 9 SCH |
| Upper Division CISA Elective | | 3 |
| Upper Division CISA Elective | | 3 |
| CISA/Business Elective | | 3 |
| ELECTIVE | | |
| | | 1 SCH |
| | GRD | SCH |
| CSCI 1137 Programming Fundamentals II Lab | | 1 |

120 CREDIT HOURS REQUIRED FOR DEGREE

- 50 OF THE 60 HOURS LISTED UNDER BUSINESS CORE AND MAJOR COURSES MUST BE COMPLETED AT A&M –SA.
- MUST RECEIVE A GRADE OF “C” OR BETTER IN ALL MATH, CSCI, AND CISA COURSES AND THEIR ASSOCIATED PREREQUISITES FOR SATISFACTORY PASSING GRADE. A MINIMUM AVERAGE GPA OF 2.25 MUST BE MAINTAINED IN ALL BUSINESS CORE AND MAJOR COURSES TO REMAIN IN PROGRAM. APPLIES TO TRANSFER COURSES ALSO.
- ACADEMIC CREDITS TRANSFERRED AS SUBSTITUTION COURSES MUST BE COMPLETED WITHIN PREVIOUS FIVE YEARS OF ADMISSION TO A&M-SA.

Bachelor of Applied Arts & Sciences- Cyber Security Concentration- Bachelors Degree

A&M-SA BAAS -IT Cyber Security Program (2019-20 Catalog, Total 120 hours)

Plan for High School (4-Year Plan) or Transfer Students. Highlighted Courses may be taken at a Community College.

Freshman Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-------------------------|---|-----------|
| ENGL 1301 | <i>Composition I - Prereq: TSI R</i> | 3 | ENGL 1302/ ENGL 2311 | <i>Composition II or Technical Writing - Prereq: ENGL 1301</i> | 3 |
| HIST 1301 | <i>US History to 1865 - Prereq: TSI</i> | 3 | HIST 1302 | <i>US History since 1865 - Prereq: TSI</i> | 3 |
| | <i>Science Course I</i> | 3 | | <i>Science Course II</i> | 3 |
| MATH 1314 | <i>College Algebra</i> | 3 | CSCI 1336 | <i>Programming Fundamentals I - Prereq: MATH 1314 or equi, Coreq: CSCI 1136</i> | 3 |
| | <i>Social & Behavioral Science</i> | 3 | CSCI 1136 | <i>Programming Fundamentals I Lab - Prereq: MATH 1314 or equi, Coreq: CSCI 1336</i> | 1 |
| UNIV 1101 | <i>JagTracks 1 - Univ Requirement</i> | 1 | | <i>Creative Arts</i> | 3 |
| Total | | 16 | Total | | 16 |

Sophomore Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|---|-----------|
| GOVT 2305 | <i>Federal Government - Prereq: TSI R</i> | 3 | GOVT 2306 | <i>Texas Government - Prereq: TSI R</i> | 3 |
| MATH 1342 | <i>Introductory Statistics</i> | 3 | | <i>Component Option Course from Approved List</i> | 3 |
| CSCI 1337 | <i>Programming Fundamentals II - Prereq: CSCI 1336, CSCI 1136</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| CSCI 1137 | <i>Programming Fundamentals II Lab - Prereq: CSCI 1336, CSCI 1136, Coreq: CSCI 1337</i> | 1 | | <i>Technical Vocational Credits</i> | 3 |
| | <i>Lang/Phil/Culture</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| UNIV 2101 | <i>JagTracks II - Univ Requirement</i> | 1 | | | |
| Total | | 14 | Total | | 15 |

Junior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|-------------------------------------|-----------|-----------------|---|-----------|
| | <i>Technical Vocational Credits</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | CISA 2306 | <i>Computer Networks - Prereq: MATH 1314</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | BCOM 3304 | <i>Business Communications - Prereq: ENGL 1301 and ENG 1302</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | CISA 3309 | <i>Scripting Languages - Prereq: CSCI 1337, CSCI 1137</i> | 3 |
| CSCI 3101 | <i>JagTracks 3</i> | 1 | | | |
| Total | | 16 | Total | | 15 |

Senior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|--|-----------|
| CISA 3356 | <i>Systems Analysis and Design</i> | 3 | CISA 4326 | <i>Security & Operation Project - Prereq: CISA 4324 or CISA 4325</i> | 3 |
| CISA 3351 | <i>Database Design and SQL - Prereq: CSCI 1336, CSCI 1136</i> | 3 | CISA 4358 | <i>Senior Seminar & Project - Prereq: CISA 3351, CISA 3356</i> | 3 |
| CISA 3321 | <i>Information Security - Prereq: CISA 2306</i> | 3 | CISA 4323 | <i>Computer Forensics - Prereq: CISA 2306, CISA 3321</i> | 3 |
| CISA 3325 | <i>Network Security - Prereq: CISA 2306 or CSCI 4406 and CSCI 3321 or CSCI 3321</i> | 3 | CISA 4324 | <i>Security Risk Analysis - Prereq: CISA 2306, CISA 3321</i> | 3 |
| CSCI 4101 | <i>JagTracks 4</i> | 1 | | <i>Upper Division CISA/CSCI course</i> | 3 |
| Total | | 13 | Total | | 15 |

Notes:

(i): For transfer students, 40 hours of Major courses + Major electives from A&M-SA are required

(ii): See Official University Catalog for all applicable requirements

Bachelor of Applied Arts & Sciences- Information Technology Concentration- Bachelors Degree

A&M-SA BAAS -IT Program (2019-20 Catalog, Total 120 hours)

Plan for High School (4-Year Plan) or Transfer Students. Highlighted Courses may be taken at a Community College.

Freshman Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-------------------------|---|-----------|
| ENGL 1301 | <i>Composition I - Prereq: TSI R</i> | 3 | ENGL 1302/ ENGL 2311 | <i>Composition II or Technical Writing - Prereq: ENGL 1301</i> | 3 |
| HIST 1301 | <i>US History to 1865 - Prereq: TSI</i> | 3 | HIST 1302 | <i>US History since 1865 - Prereq: TSI</i> | 3 |
| | <i>Science Course I</i> | 3 | | <i>Science Course II</i> | 3 |
| MATH 1314 | <i>College Algebra</i> | 3 | CSCI 1336 | <i>Programming Fundamentals I - Prereq: MATH 1314 or equi, Coreq: CSCI 1136</i> | 3 |
| | <i>Social & Behavioral Science</i> | 3 | CSCI 1136 | <i>Programming Fundamentals I Lab - Prereq: MATH 1314 or equi, Coreq: CSCI 1336</i> | 1 |
| UNIV 1101 | <i>JagTracks 1 - Univ Requirement</i> | 1 | | <i>Creative Arts</i> | 3 |
| Total | | 16 | Total | | 16 |

Sophomore Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|---|-----------|
| GOVT 2305 | <i>Federal Government - Prereq: TSI R</i> | 3 | GOVT 2306 | <i>Texas Government - Prereq: TSI R</i> | 3 |
| MATH 1342 | <i>Introductory Statistics</i> | 3 | | <i>Component Option Course from Approved List</i> | 3 |
| CSCI 1337 | <i>Programming Fundamentals II - Prereq: CSCI 1336, CSCI 1136</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| CSCI 1137 | <i>Programming Fundamentals II Lab - Prereq: CSCI 1336, CSCI 1136, Coreq: CSCI 1337</i> | 1 | | <i>Technical Vocational Credits</i> | 3 |
| | <i>Lang/Phil/Culture</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| UNIV 2101 | <i>JagTracks II - Univ Requirement</i> | 1 | | | |
| Total | | 14 | Total | | 15 |

Junior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|-------------------------------------|-----------|-----------------|---|-----------|
| | <i>Technical Vocational Credits</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | | <i>Technical Vocational Credits</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | CISA 2306 | <i>Computer Networks - Prereq: MATH 1314</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | BCOM 3304 | <i>Business Communications - Prereq: ENGL 1301 and ENG 1302</i> | 3 |
| | <i>Technical Vocational Credits</i> | 3 | CISA 3309 | <i>Scripting Languages - Prereq: CSCI 1337, CSCI 1137</i> | 3 |
| CSCI 3101 | <i>JagTracks 3</i> | 1 | | | |
| Total | | 16 | Total | | 15 |

Senior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|--|-----------|
| CISA 3356 | <i>Systems Analysis and Design</i> | 3 | CISA 4358 | <i>Senior Project & Seminar - Prereq: CISA 3351, CISA 3356</i> | 3 |
| CISA 3351 | <i>Database Design and SQL - Prereq: CSCI 1336, CSCI 1136</i> | 3 | | <i>Upper Division CISA/Business Elective</i> | 3 |
| CISA 3321 | <i>Information Security - Prereq: CISA 2306</i> | 3 | | <i>Upper Division CISA/CSCI Elective</i> | 3 |
| CISA 3325 | <i>Network Security - Prereq: CISA 2306 or CSCI 4406 and CSCI 3321 or CSCI 4321</i> | 3 | | <i>Upper Division CISA/CSCI Elective</i> | 3 |
| CSCI 4101 | <i>JagTracks 4</i> | 1 | | <i>Upper Division CISA/CSCI Elective</i> | 3 |
| Total | | 13 | Total | | 15 |

Notes:

(i): For transfer students, 40 hours of Major courses + Major electives from A&M-SA are required

(ii): See Official University Catalog for all applicable requirements

Bachelors of Science in Cyber Engineering Technology

A&M-SA BS Cyber Engineering Technology Program (2019-20 Catalog, Total 120 hours)

Plan for High School (4-Year Plan) or Transfer Students. Highlighted courses may be taken at a Community College.

Freshman Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|--|-----------|-----------------------|---|-----------|
| ENGL 1301 | Composition I - Prereq: TSI R | 3 | ENGL 1302 / ENGL 2311 | Composition II (or Tech Writing) - Prereq: ENGL 1301 | 3 |
| MATH 1314 | College Algebra | 3 | MATH 2312 | Pre-Calculus -Prereq MATH 1314 | 3 |
| | Social & Behv Sci | 3 | | Creative Arts | 3 |
| CSCI 1336 | Programming Fundamentals I - Prereq: MATH 1314 or equi, Coreq: CSCI 1136 | 3 | CSCI 1337 | Programming Fundamentals II - Prereq:CSCI 1336, CSCI 1136, Coreq:CSCI 1137 | 3 |
| CSCI 1136 | Programming Fundamentals I Lab - Prereq:MATH 1314 or equi, Coreq: CSCI 1336 | 1 | CSCI 1137 | Programming Fundamentals II Lab - Prereq:CSCI 1336, CSCI 1136, Coreq:CSCI 1337 | 1 |
| HIST 1301 | US History to 1865 - Prereq:TSI | 3 | PHYS 2325 | University Physics I | 3 |
| UNIV 1101 | JagTracks I | 1 | PHYS 2125 | University Physics I Lab | 1 |
| Total | | 17 | Total | | 17 |

Sophomore Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|--|-----------|-----------------|--|-----------|
| GOVT 2305 | Federal Government - Prereq: TSI R | 3 | GOVT 2306 | Texas Government - Prereq: TSI R | 3 |
| MATH 2313 | Calculus I - Prereq: MATH 2312 | 3 | PHYS 2326 | University Physics II - Prereq: PHYS I 2325 | 3 |
| MATH 2113 | Calculus I Lab - CoReq: MATH 2313 | 1 | PHYS 2126 | University Physics II Lab | 1 |
| HIST 1302 | US History from 1865 - Prereq: TSI | 3 | MATH 2314 | Calculus II - Prereq: MATH 2313 | 3 |
| CSCI 2325 | Computer Organization - Prereq: CSCI 1337, 1137 | 3 | MATH 2114 | Calculus II Lab - CoReq: MATH 2314 | 1 |
| CSCI 2436 | Prog Fundamentals III - Prereq:CSCI 1337, 1137 | 4 | UNIV 2101 | JagTracks II | 1 |
| | | | CISA 2306 | Computer Networks - Prereq: MATH 1314 | 3 |
| Total | | 17 | Total | | 15 |

Junior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|---|-----------|-----------------|--|-----------|
| CSCI 3321 | Cyber Security - Prereq: CSCI 1337/1137, 2436 | 3 | CETE 3370 | Cloud Computing Infrastructure and Security - Prereq: CSCI 3344 | 3 |
| CISA 3351 | Database Design and SQL - Prereq: CSCI 1336, CSCI 1136 | 3 | CISA 3325 | Network Security - Prereq: CISA 2306 or CSCI 4406, CISA 3321 or CSCI 3321 | 3 |
| CSCI 3344 | Computer Architecture - Prereq: CSCI 2325 | 3 | CETE 4481 | Penetration Testing Lab Using Python - Prereq: CSCI 1337, CSCI 1137 | 4 |
| CSCI 3101 | JagTracks III | 1 | BCOM 3304 | Business Law | 3 |
| | Lang/Phil/Culture | 3 | | | |
| Total | | 13 | Total | | 13 |

Senior Year

| Fall Semester | | Hrs | Spring Semester | | Hrs |
|---------------|--|-----------|-----------------|--|-----------|
| CETE 4375 | Wireless and Mobile Security - Prereq: CISA 2306 | 3 | CETE 4385 | Cyber Security Architecture - Prereq/Coreq: CSCI 3321 | 3 |
| CETE 4380 | Applied Cryptosystems - Prereq: CSCI 3321 | 3 | CETE 4392 | Big Data Analytics and Security - Prereq: CSCI 2436 | 3 |
| CETE 4390 | Cyber Physical Systems Security - Prereq: CSCI 3321 | 3 | CETE 4394 | Cyber Intelligence -Pre req: CSCI 3321 | 3 |
| BLAW3341 | Business Law | 3 | CETE 4396 | Special Topics in Cyber Engineering Technology | |
| MGMT 3311 | Principles of Management | 3 | MGMT 4327 | Organizational Behavior | 3 |
| | | | CSCI 4101 | JagTracks IV | 1 |
| Total | | 15 | Total | | 13 |

Bachelor of Science in Cyber Engineering Technology 2019-2020 Degree Plan

| CORE CURRICULUM (See note below) | | 42 SCH | |
|--|------------|---------------|--|
| | Grd | SCH | |
| (010) COMMUNICATION | | | |
| ENGL 1301 Composition I | | 3 | |
| ENGL 1302 Composition II or ENGL 2311 Technical Writing | | 3 | |
| (020) MATHEMATICS | | | |
| MATH 1314 College Algebra | | 3 | |
| (030) LIFE AND PHYSICAL SCIENCES | | | |
| PHYS I 2325 University Physics I | | 3 | |
| PHYS II 2326 University Physics II | | 3 | |
| (040) LANGUAGE, PHILOSOPHY, AND CULTURE | | | |
| Language/Philosophy/Culture | | 3 | |
| (050) CREATIVE ARTS | | | |
| Creative Arts | | 3 | |
| (060) AMERICAN HISTORY | | | |
| American History | | 3 | |
| American History | | 3 | |
| (070) GOVERNMENT / POLITICAL SCIENCE | | | |
| Government / Political Science | | 3 | |
| Government / Political Science | | 3 | |
| (080) SOCIAL AND BEHAVIORAL SCIENCE | | | |
| Social and Behavioral Science | | 3 | |
| (090) COMPONENT AREA OPTION | | | |
| MATH 2312 Pre-Calculus | | 3 | |
| MATH 2313 Calculus I | | 3 | |
| Departmental Requirements | | 7 SCH | |
| | Grd | SCH | |
| MATH 2314 Calculus II or Linear Algebra | | 3 | |
| MATH 2113 Calculus I Lab | | 1 | |
| MATH 2114 Calculus II Lab | | 1 | |
| PHYS I 2125 University Physics I Lab | | 1 | |
| PHYS II 2126 University Physics II Lab | | 1 | |
| UNIVERSITY REQUIREMENTS | | 4 SCH | |
| | Grd | SCH | |
| UNIV 1101 Jaguar Tracks I | | 1 | |
| UNIV 2101 Jaguar Tracks II | | 1 | |
| CSCI 3101 Jaguar Tracks III Computer Science | | 1 | |
| CSCI 4101 Jaguar Tracks IV Computer Science | | 1 | |

Note about core curriculum courses: Other courses may satisfy core curriculum requirements. Courses listed under the core curriculum above are also specific degree requirements, and are recommended in the core to expedite degree completion.

| Required Support Courses | | 18 SCH | |
|--|-----------|---------------|--|
| | Gr | SCH | |
| CSCI 1136 Programming Fundamentals I Lab | | 1 | |
| CSCI 1137 Programming Fundamentals II Lab | | 1 | |
| CSCI 1336 Programming Fundamentals I | | 3 | |
| CSCI 1337 Programming Fundamentals II | | 3 | |
| CSCI 2436 Programming Fundamentals III | | 4 | |
| CSCI 2325 Computer Organization | | 3 | |
| CISA 2306 Computer Networks | | 3 | |
| Major Courses | | | |
| | | 28 SCH | |
| CSCI 3321 Cyber Security | | 3 | |
| CISA 3325 Network Security | | 3 | |
| CSCI 3344 Computer Architecture | | 3 | |
| CISA 3351 Database Design and SQL | | 3 | |
| CETE 3370 Cloud Computing Infrastructure and Security | | 3 | |
| CETE 4375 Wireless and Mobile Security | | 3 | |
| CETE 4380 Applied Cryptosystems | | 3 | |
| CETE 4385 Cyber Security Architecture | | 3 | |
| CETE 4481 Penetration Testing Using Python | | 4 | |
| Major Electives | | 9 SCH | |
| CETE 4390 Cyber Physical Systems Security | | 3 | |
| CETE 4392 Big Data Analytics and Security | | 3 | |
| CETE 4394 Cyber Intelligence | | 3 | |
| CETE 4396 Special Topics in Cyber Engineering Technology | | 3 | |
| <i>Select three of the above four elective courses</i> | | | |
| Required Business Core Course | | 12 SCH | |
| BCOM 3304 Business Communication | | 3 | |
| MGMT 3311 Principles of Management | | 3 | |
| BLAW 3341 Business Law | | 3 | |
| MGMT 4327 Organizational Behavior | | 3 | |

120 CREDIT HOURS REQUIRED FOR DEGREE

- 30 CETE/CSCI/CISA UPPER-DIVISION HOURS REQUIRED FOR THIS DEGREE MUST BE COMPLETED AT A&M-SA TO SATISFY RESIDENCY REQUIREMENT
- MUST COMPLETE AT LEAST 40 HOURS OF MAJOR COURSES+ MAJOR ELECTIVES AT A&M-SA.
- MUST RECEIVE A GRADE OF "C" OR BETTER IN ALL MATH, CSCI, CISA AND CETE COURSES AND THEIR ASSOCIATED PREREQUISITES FOR SATISFACTORY PASSING GRADE. A MINIMUM AVERAGE GPA OF 2.25 MUST BE MAINTAINED IN ALL CETE, CSCI & CISA CORE AND ELECTIVE COURSES TO REMAIN IN PROGRAM. APPLIES TO TRANSFER COURSES ALSO.
- ACADEMIC CREDITS TRANSFERRED AS SUBSTITUTION COURSES MUST BE COMPLETED WITHIN PREVIOUS FIVE YEARS OF ADMISSION TO A&M-SA.

Texas A&M University - San Antonio
Master of Science in Computer Science, 2019-2020

| | | | |
|--------------------------|--------------------------|-------------------|--|
| Student | | J#: | |
| Semester of Entry | Catalog 2019-2020 | Degree | MS Major Computer Science |
| Admission Status | | Conditions | |
| Phone Number | | Email | |

MS DEGREE REQUIREMENTS (36 SCH)

1. 12 Semester Credit hours of Required Graduate Computer Science Courses

| Course | Description | Grade | Semester | University |
|-----------|-------------------|-------|----------|------------|
| CSCI 5304 | Database Systems | | | |
| CSCI 5306 | Computer Networks | | | |
| CSCI 5362 | Operating Systems | | | |
| CSCI 5343 | Algorithms | | | |

2. 12 Semester Credit hours of Graduate Electives in Cyber Security Courses

| Course | Description | Grade | Semester | University |
|-----------|---|-------|----------|------------|
| CSCI 5321 | Information Assurance and Risk Management | | | |
| CSCI 5323 | Cryptography and Secure Communication | | | |
| CSCI 5326 | Security in Emerging Technologies | | | |
| CSCI 5327 | Information Security | | | |

3. 9 Semester Credit hours of Free Elective Courses in CS or CIS

| Course | Description | Grade | Semester | University |
|-----------|------------------------------------|-------|----------|------------|
| CSCI 5313 | Artificial Intelligence | | | |
| CSCI 5345 | Mobile Applications Development II | | | |
| CISA 5334 | Business Process Integration | | | |
| CISA 5340 | Systems Analysis and Design | | | |
| CISA 5335 | ABAP SAP Programming | | | |
| CSCI 5315 | Big Data Analytics | | | |
| CSCI 5372 | Cloud Computing | | | |
| CSCI 5393 | Special Topics in Computer Science | | | |

4. 3 Semester Credit hours of Graduate Seminar Course

| Course | Description | Grade | Semester | University |
|-------------|------------------|-------|----------|------------|
| **CSCI 5391 | Graduate Seminar | | | |

Total SCH 36 ***To be taken during the last semester with the approval of the graduate advisor.*

Two-Year Master of Computer Science Degree Program (Cybersecurity Track)

| 1 st Year | | | | | |
|----------------------|----------------------|----------|-------------------|---------------------------------------|----------|
| Fall Semester | | | Spring Semester | | |
| Prefix and Number | Course Name | SCH | Prefix and Number | Course Name | SCH |
| CSCI 5304 | Database Systems | 3 | CSCI 5362 | Operating Systems | 3 |
| CSCI 5306 | Computer Networks | 3 | CSCI 5343 | Algorithms | 3 |
| CSCI 5327 | Information Security | 3 | CSCI 5323 | Cryptography and Secure Communication | 3 |
| | | 9 | | | 9 |

| 2 nd Year | | | | | |
|----------------------|------------------------------|----------|-------------------|----------------------------|----------|
| Fall Semester | | | Spring Semester | | |
| Prefix and Number | Course Name | SCH | Prefix and Number | Course Name | SCH |
| CSCI 5321 | Info Assurance and Risk Mgmt | 3 | CSCI 5326 | Security in Emerging Techs | 3 |
| CSCI 5315 | Big Data Analytics | 3 | CSCI 5313 | Artificial Intelligence | 3 |
| CSCI 5372 | Cloud Computing | 3 | *CSCI 5391 | Graduate Seminar | 3 |
| | | 9 | | | 9 |

Total SCH 36 **To be taken during the last semester with the approval of the graduate advisor.*

Master of Science in Computer Science - Tracks

| Prefix and Number | Required Core Courses | SCH |
|--------------------------|------------------------------|------------|
| CSCI 5304 | Database Systems | 3 |
| CSCI 5306 | Computer Networks | 3 |
| CSCI 5362 | Operating Systems | 3 |
| CSCI 5343 | Algorithms | 3 |
| Total | | 12 |

| Prefix and Number | Prescribed Elective Courses – Software Applications | SCH |
|--------------------------|--|------------|
| CSCI 5353 | Secure Software Development | 3 |
| CSCI 5325 | Mobile Applications Development I | 3 |
| CSCI 5316 | Software Engineering | 3 |
| CSCI 5366 | Software Testing and Quality Assurance | 3 |
| Total | | 12 |

| Prefix and Number | Prescribed Elective Courses – Cyber Security | SCH |
|--------------------------|---|------------|
| CSCI 5321 | Information Assurance and Risk Management | 3 |
| CSCI 5323 | Cryptography and Secure Communication | 3 |
| CSCI 5326 | Security in Emerging Technologies | 3 |
| CSCI 5327 | Information Security | 3 |
| Total | | 12 |

| Prefix and Number | Prescribed Elective Courses – Enterprise Systems | SCH |
|--------------------------|---|------------|
| CSCI 5311 | Software Project Management | 3 |
| CSCI 5320 | Decision Support Systems | 3 |
| CSCI 5331 | Enterprise Resource Planning | 3 |
| CSCI 5332 | Business Intelligence and Data Mining | 3 |
| Total | | 12 |

| Prefix and Number | Free Elective Courses (in addition to the prescribed courses) | SCH |
|--------------------------|--|------------|
| CSCI 5313 | Artificial Intelligence | 3 |
| CSCI 5345 | Mobile Applications Development II | 3 |
| CISA 5334 | Business Process Integration | 3 |
| CISA 5340 | Systems Analysis and Design | 3 |
| CISA 5335 | ABAP SAP Programming | 3 |
| CSCI 5315 | Big Data Analytics | 3 |
| CSCI 5372 | Cloud Computing | 3 |
| CSCI 5393 | Special Topics in Computer Science | 3 |

| Prefix and Number | Courses | SCH |
|--------------------------|------------------|------------|
| CSCI 5391 | Graduate Seminar | 3 |
| CSCI 5395 | Thesis | 3 |

Computer Science (CSCI) Undergraduate Course Descriptions

CSCI 1136. Programming Fundamentals I Laboratory. 1(0-3)

This is the accompanying laboratory for CSCI 1336: Programming Fundamentals I. Students will work hands-on in a computer laboratory to write programs on topics in software development methodology, data types, control structures, functions, arrays, and the mechanics of running, testing, and debugging. Meets College of Business Experiential Learning Requirements. *Prerequisites:* Math 1314 or equivalent. *Corequisite:* CSCI 1336.

CSCI 1137. Programming Fundamentals II Laboratory. 1(0-3)

This is the accompanying laboratory for CSCI 1337: Programming Fundamentals II. Students will work hands-on in a computer laboratory to write programs on topics in the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design as well as abstract data types. It provides additional experience with advanced programming concepts and applies the basic concepts of efficiency in algorithm development and implementation. Meets College of Business Experiential Learning Requirements. *Prerequisites:* CSCI 1336 and CSCI 1136. *Corequisite:* CSCI 1337.

CSCI 1336. Programming Fundamentals I. 3(3-0)

This course introduces the fundamental concepts of structured programming. Topics include software development methodology, data types, control structures, functions, arrays, and the mechanics of running, testing, and debugging. *Prerequisites:* MATH 1314 or equivalent. *Corequisite:* CSCI 1136.

CSCI 1337. Programming Fundamentals II. 3(3-0)

This course introduces and applies the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design as well as abstract data types. It provides additional experience with advanced programming concepts and applies the basic concepts of efficiency in algorithm development and implementation. *Prerequisites:* CSCI 1336 and CSCI 1136. *Corequisite:* CSCI 1137.

CSCI 2322. Discrete Structures for Computing. 3(3-0)

This course provides the mathematical foundations from discrete mathematics for analyzing computer algorithms, for both correctness and performance; introduction to models of computation, including regular expressions, finite state machines and Turing machines. *Prerequisites:* CSCI 1337 and CSCI 1137.

CSCI 2325. Computer Organization 3(3-0)

This course introduces basic computer organization, digital representation of data and instruction, computer arithmetic, logic and shift units, data formats, addressing modes, instruction sets and microcode (general Assembly language), systems including caches, and design of a simple computer. *Prerequisites:* CSCI 1337 and CSCI 1137.

CSCI 2353 Web App Programming 3 (3-0)

This course covers the fundamental concepts of designing and developing web applications. The content is focused on strategies and techniques for designing and structuring web applications. Topics include designing interfaces in HTML, CSS, and JavaScript, writing basic scripts in PHP, and working with databases on a client-server architecture. *Prerequisite:* CSCI 1137 and CSCI 1337.

CSCI 2436 Programming Fundamentals III 4 (4-0)

This course introduces the fundamental concepts of data structures and expands on the concepts control structure, data types and algorithms. Topics include recursion, fundamental data structures (including tacks, queues, linked lists, hash tables, trees, and graphs), and algorithmic analysis. Includes basic analysis of algorithms, searching and sorting techniques, and an introduction to software engineering. Course includes lab component for lab based exercises. *Prerequisites:* CSCI 1137 and CSCI 1337.

CSCI 3101. Jaguar Tracks III Computer Science. 1(1-0)

In this course, students will identify their skills, strengths, interests, and values as it relates to future career goals within their discipline. Students will seek opportunities to gain transferable and direct skills to apply to future career goals. Through mock interviews, writing a professional and concise resume and cover letter, and researching professional organizations, students will be prepared to become active members of the community within their discipline. *Prerequisite:* 60 or more earned academic semester credit hours.

CSCI 3304. Database Systems. 3(3-0)

This course examines file and database organization techniques including network, hierarchical, relational, object and SQL data models, commercially available and open source database systems, database design and implementation, query language, transaction processing, database administration and database security. *Prerequisites:* CSCI 2436.

CSCI 3321. Cyber Security. 3(3-0)

This course will introduce students to the concepts, principles, and applications of cyber security including privacy, information security, and critical infrastructure. This course will explore the knowledge and skills needed to ensure security of information and computer systems within organizations. *Prerequisites:* CSCI 1137, CSCI 1337, and (CSCI 2436 or CISA 3309).

CSCI 3343. Algorithms. 3(3-0)

This course provides the basic tools to give students the ability to select algorithms appropriate to particular purposes and to apply them, recognizing the possibility that no suitable algorithm may exist. It examines the range of algorithms that address important sets of well-defined problems, recognizing their strengths and weaknesses, and their suitability in particular contexts. Time and space efficiency is a pervasive theme throughout this course. *Prerequisites:* CSCI 2436, MATH 2114 and MATH 2314.

CSCI 3344. Computer Architecture. 3(3-0)

This course introduces Basic Processor Design; Performance Evaluation; Pipelining; Memory Hierarchies: Caches, Virtual memory; Input/output and Storage; Introduction to Instruction Level Parallelism. *Prerequisite:* CSCI 2325.

CSCI 3352. System Programming. 3(3-0)

A programming intensive course that investigates program implementation theory, methods, and tools, as well as system utility programming using operating system programming interfaces and system calls to provide computer and process management capabilities. *Prerequisites:* CSCI 2325 and CSCI 2436.

CSCI 3353. Applications Programming. 3(3-0)

A programming intensive course that introduces key topic areas in Computer Science, such as graphics, intelligent systems, simulation and modeling, and parallel and distributed processing. Formerly CSCI 3351. *Prerequisite:* CSCI 2436.

CSCI 3362. Operating Systems. 3(3-0)

This course provides a comprehensive study of the concepts incorporated in modern operating systems. Students learn to view operating systems on the continuum from the designer to the user. This area is undergoing massive change as computer systems are becoming ubiquitous and operating systems are being designed for systems ranging from home appliances and automobiles to smart phones and other personal devices, to the more traditional computer systems used to process the myriad information used in governmental, business, and private organizations. *Prerequisites:* CSCI 2325 and CSCI 2436.

CSCI 3366. Programming Languages. 3(3-0)

This course covers different programming languages paradigms, formal definition of programming languages including specification of syntax and semantics, precedence, infix, prefix and postfix notation, list processing, string manipulation, data description and simulation languages, run-time representation of program and data structures. *Prerequisites:* CSCI 2322 and CSCI 2436.

CSCI 4101. Jaguar Tracks IV: Computer Science. 1(1-0)

In this course, students will identify the various ethical issues and values as it relates to future careers within their discipline. Students will study various cases and identify the ethical issues, and seek mechanisms for addressing and resolving the issues. Through mock debates, studying, writing and presenting professional ethical analysis studies, students will be prepared to understand and address the ethical issues within their discipline. *Prerequisite:* UNIV 3101 or CSCI 3101, 90, or more earned academic semester credit hours.

CSCI 4315. Computer Graphics. 3(3-0)

Man-machine communication in graphical form. Graphics hardware and software. Use of a commercial graphics package. Representation and manipulation of two- and three-dimensional data. Use of color. *Prerequisite:* CSCI 2436 or instructor approval.

CSCI 4316. Software Engineering I. 3(3-0)

Introduction to formal software design principles. An engineering approach to software development. Software project management. Software requirements analysis, specification, design, development and validation. *Prerequisites:* CSCI 2436.

CSCI 4317. Software Engineering II. 3(3-0)

This course completes a two-course sequence on engineering principles applied in the software development lifecycle. Students implement the design they developed and validated in the first course and prepare the resulting system for operations and maintenance. Course materials also address current topics in the area of software engineering. *Prerequisite:* CSCI 4316.

CSCI 4321. Computer Security. 3(3-0)

This course covers the topics of computer security and information security in greater detail. Topics will include cryptography, security protocols, web security, network security, software-security, mobile security, intrusion detection and prevention systems, vulnerability assessment, and other security technologies. Special emphasis is on application and software security issues. Hands-on exercises are included to reinforce the material. *Prerequisites:* CSCI 2436, CSCI 4406, and MATH 3340.

CSCI 4322 Cyber Intelligence 3 (3-0)

This course will integrate knowledge from introductory security courses with knowledge from data science and analytics. Major subjects include cyber operations and management, cyber defense and offense, malware analysis, and reverse engineering. The course will be built based on NIST NICE Cyber framework. *Prerequisite:* CSCI 3321 or CISA 4321.

CSCI 4325. Mobile App Development I. 3(3-0)

This course covers the fundamental concepts of designing and developing software applications targeted for mobile devices such as those running the Android operating system. The content is focused on strategies and techniques for designing and structuring mobile applications, including user interface screen layouts, the definition of program logic, and the connection between them. The application life cycle in the mobile environment and its important implications on application design is also examined. *Prerequisites:* CSCI 2436 or CISA 2305.

CSCI 4331. Cryptography. 3(3-0)

This course covers an introduction to various topics in cryptography including conventional and public-key cryptography, authentication and digital signatures, pseudo-random sequences, hash functions, key management. Software applications using these techniques will be studied in addition to an introduction to current cryptographic techniques and applications. *Prerequisites:* CSCI 3343, CSCI 4406

CSCI 4335. Mobile App Development II. 3(3-0)

This course covers the technologies, tools, and techniques used to develop software applications targeted for mobile devices running software such as the iOS operating system. The content is focused on strategies and techniques for designing and structuring mobile applications, including user interface layouts, gesture-based interfaces, integrated location services, multi-touch event handling, Apple iOS platform, Xcode IDE, and Swift programming language. The application life cycle in the mobile environment and its important implications on the application design is also examined. *Prerequisites:* CSCI 2436 or CISA 2305.

CSCI 4359. Advanced Topics in Computer Science. 3(3-0)

Research in selected fields of computer science. *Prerequisite:* Consent of instructor. May be repeated once for additional credit.

CSCI 4391. Senior Project. 3(3-0)

Students will work individually or as teams on topics/projects related to the industry or research. Faculty will help students in the selection process and students will produce several deliverables within the course toward the goal of their project completion. Meets College of Business Experiential Learning Requirements. *Prerequisites:* CSCI 4316.

CSCI 4406 Computer Networks 4(4-0)

This course covers subjects related to computer networks including TCP/IP and OSI models, network applications, distributed systems and an introduction to network security. The course focuses on concepts, principles and technologies that enable the use of current computer networks and protocols. Course includes lab component for lab based exercises. *Prerequisites:* CSCI 2436, CSCI 3321, and MATH 3340

MS Computer Science (CSCI) Course Description

CSCI 5304. Database Systems (3-0)

This course will cover issues like database design, database programming techniques, specialized database models, file and database organization techniques, query processing and optimization, and database security. It will also explore emerging database models like NoSQL databases and Big data. Prerequisite: CCS Department Approval.

CSCI 5306. Computer Networks (3-0)

This course provides exposure to advanced topics in computer networks including recent research findings in this field. The topics include: internetworking, Internet concept, Client-server model for applications, Network and internet management. Also, this course covers recently emerging protocols and technologies such as: Virtualization and Software Defined Networks (SDNs), IPv6, wireless networks, Secure Socket Layer, and Transport Layer Security. More advanced topics to be determined by the instructor. Prerequisite: CCS Department Approval.

CSCI 5311. Software Project Management (3-0)

This course will examine methods manage software projects, introduce the major software management processes. Major subjects will also include to learn the principles of effort estimation, human resource management, risk management and resource allocation. Students will master essential techniques to develop software project management contracts and to manage the quality of the developed software. Prerequisite: CCS Department Approval.

CSCI 5313. Artificial Intelligence (3-0)

This course examines the concepts, principles, and application of artificial intelligence in various contexts of problem-solving and learning, knowledge-based representation and reasoning, and natural language processing. This course provides fundamental knowledge on artificial intelligence and its application methodologies. Prerequisite: CCS Department Approval.

CSCI 5315. Big Data Analytics (3-0)

This course will introduce students to the concepts, principles, and application of big data and big data analytics. It will provide knowledge and practical experience on big data analytics tools and platforms including MapReduce, Hadoop, and Spark which leverage big data to solve current business problems. Prerequisite: CCS Department Approval.

CSCI 5316. Software Engineering (3-0)

Processes of quality software development using an engineering approach. Software models - traditional and agile. Problem statement, requirements analysis, specification, design, development, integration, testing, risk, quality, patterns, management. Team Project. Prerequisites: CCS Department Approval.

CSCI 5320. Decision Support Systems (3-0)

A study of computer-based systems that support unstructured and semi-structured decision-making by individuals or groups. These systems include: decision support systems, group decision support systems, executive information systems and expert systems. Prerequisites: CCS Department Approval.

CSCI 5321. Information Assurance and Risk Management (3-0)

Examines risk management in complex information systems using formal security risk analysis and risk mitigation methods. Introduces students to the federal government certification and accreditation process and how that is integrated with private industry partners. Students will develop skills in security compliance and risk assessment. Prerequisite: CCS Department Approval

CSCI 5323. Cryptography and Secure Communication (3-0)

Design of secret codes for secure communication, including encryption and integrity verification: ciphers, cryptographic hashing, and public key cryptosystems such as RSA and ECC. Private key encryption such as AES and Bluefish. Mathematical principles underlying encryption. Codebreaking techniques. Cryptographic protocols. Prerequisites: CCS Department Approval.

CSCI 5325. Mobile App Development I (3-0)

This course examines the concepts, principles, and application of artificial intelligence in various contexts of problem-solving and learning, knowledge-based representation and reasoning, and natural language processing. This course provides fundamental knowledge on artificial intelligence and its application methodologies. Prerequisites: CCS Department Approval.

CSCI 5326. Security in Emerging Technologies (3-0)

This course investigates the state-of-art of security and associated risks, threats, and defense mechanisms in current emerging technologies including cloud computing, Internet of Things, and software-defined networks. It provides knowledge on security concepts and intelligent security techniques to apply them for solving security issues in new technological domains. Prerequisites: CCS Department Approval.

CSCI 5327. Information Security (3-0)

This course provides a comprehensive view of information security and provides exposure to some advanced topics information security and assurance, including some recent research results. These topics include: advanced authentication, intrusion detection, digital forensics, collecting evidence and data retrieval techniques, and many other topics. Also, this course explores the growing challenges of securing sensitive data, networks, mobile devices and applications with different privacy controls to defend against malicious acts. Also, this course addresses new trends in computer science and how machine learning and anti-malware defenses can respond to threats, and protect networks, infrastructure and users. More advanced topics to be determined by the instructor. Prerequisites: CCS Department Approval.

CSCI 5331. Enterprise Resource Planning (3-0)

Exposes students to complex issues with enterprise resource planning (ERP) system development and operation. Students explore ERP technology and life cycle planning, business process redesign, process mapping, and risk management and security in ERP systems. Students will develop skills in an ERP system such as SAP. Prerequisites: CCS Department Approval.

CSCI 5332. Business Intelligence and Data Mining (3-0)

This course provides students with an overview of Business Intelligence, Analytics, and Decision Support. The course will discuss topics like Descriptive Analytics, Predictive Analytics, Prescriptive Analytics, Text Mining, and Web Analytics. Prerequisites: CCS Department Approval.

CSCI 5343. Algorithms (3-0)

This course covers the mobile application development frameworks; architecture, design and engineering issues, techniques, methodologies for mobile application development targeted for mobile devices running iOS operating system. Prerequisites: CCS Department Approval.

CSCI 5345. Mobile App Development II (3-0)

This course covers the mobile application development frameworks; architecture, design and engineering issues, techniques, methodologies for mobile application development targeted for mobile devices running iOS operating system. Prerequisites: CCS Department Approval.

CSCI 5353. Secure Software Development (3-0)

This course covers the mobile application development frameworks; architecture, design and engineering issues, techniques, methodologies for mobile application development targeted for mobile devices running iOS operating system. Prerequisites: CCS Department Approval.

CSCI 5362. Operating Systems (3-0)

This course covers advanced topics in Operating systems. Course will cover subjects from the different OS environments: Windows, Linux, MAC, mobile and web operating systems. Course will also focus on the assessment and evaluation of operating systems security. Course will be conducted on a research-based and students will work on current research trends in operating systems. CCS Department Approval.

CSCI 5366. Software Quality Assurance (3-0)

This course will introduce software quality assurance and software testing. The course will cover different techniques and algorithms of software testing which include unit, integration, system and interface testing techniques. This course will cover the black-box and white-box testing, software testing throughout the software process, and software quality metrics and quality assurance. Prerequisites: CCS Department Approval.

CSCI 5372. Cloud Computing (3-0)

This course educates the students about building cloud infrastructure based on a cloud computing reference model. The reference model includes five fundamental layers (physical, virtual, control, orchestration, and service) and three cross-layer functions (business continuity, security, and service management) for building a cloud infrastructure. For each layer and cross-layer function, this course covers the comprising technologies, components, processes, and mechanisms. This course takes an open-approach to describe the concepts and technologies. The course follows the U.S. National Institute of Standards and Technology as a guide for all definitions of cloud computing. Prerequisites: CCS Department Approval.

CSCI 5391. Graduate Seminar (3-0)

This course will provide a broad range of current research topics in computer science and related fields to non-thesis track students to complete a major project and presentation to demonstrate the knowledge and skills. Non-thesis track graduate students in the MSCS program must register this course at the last semester of their graduate studies. Prerequisites: Successfully Completed 24 hours of CS graduate courses and CCS Department Approval

CSCI 5393. Special Topics in Computer Science (3-0)

This course will introduce one or more advanced topics in an area of computer science. May be repeated when topic changes. Prerequisites: CCS Department Approval.

CSCI 5395. Thesis (3-0)

This course will provide an experience of undertaking and completing a piece of research, applying techniques learned throughout the program Thesis track students in MSCS program will complete a thesis and present to demonstrate the research accomplishment . Thesis track graduate students in the MSCS program must register this course at the last two semesters of their graduate studies. Prerequisites: Successfully Completed 24 hours of graduate CS courses and CCS Department Approval.

CSCI 3366. Programming Languages. 3(3-0)

This course covers different programming languages paradigms, formal definition of programming languages including specification of syntax and semantics, precedence, infix, prefix and postfix notation, list processing, string manipulation, data description and simulation languages, run-time representation of program and data structures. *Prerequisites:* CSCI 2322 and CSCI 2436.

CSCI 4101. Jaguar Tracks IV: Computer Science. 1(1-0)

In this course, students will identify the various ethical issues and values as it relates to future careers within their discipline. Students will study various cases and identify the ethical issues, and seek mechanisms for addressing and resolving the issues. Through mock debates, studying, writing and presenting professional ethical analysis studies, students will be prepared to understand and address the ethical issues within their discipline. *Prerequisite:* UNIV 3101 or CSCI 3101, 90, or more earned academic semester credit hours.

CSCI 4315. Computer Graphics. 3(3-0)

Man-machine communication in graphical form. Graphics hardware and software. Use of a commercial graphics package. Representation and manipulation of two- and three-dimensional data. Use of color. *Prerequisite:* CSCI 2436 or instructor approval.

CSCI 4316. Software Engineering I. 3(3-0)

Introduction to formal software design principles. An engineering approach to software development. Software project management. Software requirements analysis, specification, design, development and validation. *Prerequisites:* CSCI 2436.

CSCI 4317. Software Engineering II. 3(3-0)

This course completes a two-course sequence on engineering principles applied in the software development lifecycle. Students implement the design they developed and validated in the first course and prepare the resulting system for operations and maintenance. Course materials also address current topics in the area of software engineering. *Prerequisite:* CSCI 4316.

CSCI 4321. Computer Security. 3(3-0)

This course covers the topics of computer security and information security in greater detail. Topics will include cryptography, security protocols, web security, network security, software-security, mobile security, intrusion detection and prevention systems, vulnerability assessment, and other security technologies. Special emphasis is on application and software security issues. Hands-on exercises are included to reinforce the material. *Prerequisites:* CSCI 2436, CSCI 4406, and MATH 3340.

CSCI 4322 Cyber Intelligence 3 (3-0)

This course will integrate knowledge from introductory security courses with knowledge from data science and analytics. Major subjects include cyber operations and management, cyber defense and offense, malware analysis, and reverse engineering. The course will be built based on NIST NICE Cyber framework. *Prerequisite:* CSCI 3321 or CISA 4321.

CSCI 4325. Mobile App Development I. 3(3-0)

This course covers the fundamental concepts of designing and developing software applications targeted for mobile devices such as those running the Android operating system. The content is focused on strategies and techniques for designing and structuring mobile applications, including user interface screen layouts, the definition of program logic, and the connection between them. The application life cycle in the mobile environment and its important implications on application design is also examined. *Prerequisites:* CSCI 2436 or CISA 2305.

CSCI 4331. Cryptography. 3(3-0)

This course covers an introduction to various topics in cryptography including conventional and public-key cryptography, authentication and digital signatures, pseudo-random sequences, hash functions, key management. Software applications using these techniques will be studied in addition to an introduction to current cryptographic techniques and applications. *Prerequisites:* CSCI 3343, CSCI 4406

CSCI 4335. Mobile App Development II. 3(3-0)

This course covers the technologies, tools, and techniques used to develop software applications targeted for mobile devices running software such as the iOS operating system. The content is focused on strategies and techniques for designing and structuring mobile applications, including user interface layouts, gesture-based interfaces, integrated location services, multi-touch event handling, Apple iOS platform, Xcode IDE, and Swift programming language. The application life cycle in the mobile environment and its important implications on the application design is also examined. *Prerequisites:* CSCI 2436 or CISA 2305.

CSCI 4359. Advanced Topics in Computer Science. 3(3-0)

Research in selected fields of computer science. *Prerequisite:* Consent of instructor. May be repeated once for additional credit.

CSCI 4391. Senior Project. 3(3-0)

Students will work individually or as teams on topics/projects related to the industry or research. Faculty will help students in the selection process and students will produce several deliverables within the course toward the goal of their project completion. Meets College of Business Experiential Learning Requirements. *Prerequisites:* CSCI 4316.

CSCI 4406 Computer Networks 4(4-0)

This course covers subjects related to computer networks including TCP/IP and OSI models, network applications, distributed systems and an introduction to network security. The course focuses on concepts, principles and technologies that enable the use of current computer networks and protocols. Course includes lab component for lab based exercises. *Prerequisites:* CSCI 2436, CSCI 3321, and MATH 3340

Computer Information Systems (CISA)

1305. Business Computer Applications. 3(3-0)

Students will study computer terminology, hardware, and software, security and privacy related to the business environment. Introduce and develop foundational skills in applying essential and emerging business productivity information technology tools. The focus of this course is on business productivity software applications and professional behavior in computing, including word processing (as needed), spreadsheets, databases, presentation graphics, and business-oriented utilization of the internet. Students will study the use of web-based technologies to conduct ethical business research.

2301. Microcomputer Assembly Language. 3(3-0)

Theory, concepts and terminology required for competency in microcomputer assembly language programming including machine instructions; basic data types; addressing modes; arithmetic, logical and character string operations; interrupts and I/O interfaces. *Prerequisites:* CSCI 1337, CSCI 1137.

2302. Business Applications Using C++. 3(3-0)

Concepts and applications of the C++ programming language for business and industry. *Prerequisites:* CSCI 1336 and CSCI 1136.

2305. Java Programming. 3(3-0)

This course discusses concepts and applications of the Java programming languages for business and industry. Topics include the fundamentals of Java programming, control structures, methods, arrays, object-oriented programming, concepts, and other advanced topics. *Prerequisites:* CSCI 1336 and CSCI 1136.

2306. Computer Networks. 3(3-0)

This course covers subjects related to computer networks including TCP/IC and OSI models, network applications, distributed systems and an introduction to network security. The course focuses on concepts, principles and technologies that enable the integration of information and telecommunications systems for support of internal and external business activities. *Prerequisites:* MATH 1314.

2354. COBOL Programming I. 3(3-0)

Fundamentals and techniques of programming in the COBOL language including program design and structure, flow charting and documentation. *Prerequisites:* CSCI 1336 and CSCI 1136.

3101. Jaguar Tracks III: Computer Information Systems. 1(1-0)

In this course students will identify their skills, strengths, interests, and values as it relates to future career goals within their discipline. Students will seek opportunities to gain transferable and direct skills to apply to future career goals. Through mock interviews, writing a professional and concise resume and cover letter, and researching professional organizations, students will be prepared to become active members of the community within their discipline. *Prerequisites:* UNIV 2101 or 60 or more earned academic semester credit hours.

3304. Database Systems. 3(3-0)

This course examines file and database organization techniques including network, hierarchical, relational, object and NoSQL data models, commercially available and open source database systems, database design and implementation, query language, transaction processing, database administration and database security. *Prerequisites:* CSCI 1336, CSCI 1136 and CISA 3351.

3309. Scripting Languages. 3(3-0)

This course introduces students to common scripting languages used in computing. It examines the overall design of scripting languages as well as the specific syntax of common scripting languages. Students will develop projects in each of the languages examined and will determine the best application environment for each of the languages examined. *Prerequisites:* CSCI 1337 and CSCI 1137.

3311. Project Management. 3(3-0)

This course examines the concepts, principles, and applications of project management in the business environment, including the study of project management procedures, project management tools, organizational structure, management of project team members, and the planning, organizing, and control activities necessary for good projects. There will be an emphasis of information technology (IT) in the course lectures; however, projects do not have to include an IT component. *Prerequisite:* Completed 30 hours.

3321. Information Security. 3(3-0)

This course examines the concepts, principles, and applications of computer security in the business environment including privacy, information security, and critical infrastructure and explores the knowledge and skills needed to ensure security of information and information systems within organizations. *Prerequisite:* CISA 2306.

3325. Network Security. 3(3-0)

The course explores mechanisms for protecting networks against attacks with an emphasis placed on network security applications for the Internet and corporate networks. The course also investigates various networking security standards and explores methods for enforcing and enhancing those standards. *Prerequisites:* CISA 2306 or CSCI 4406 and CISA 3321 or CSCI 3321.

3328. Internship in Computer Information Systems. 3(3-0)

An off-campus learning experience allowing the acquisition and application of information technology skills in an actual work setting. *Prerequisites:* CSCI 1336 and CSCI 1136.

3351. Database Design and SQL. 3(3-0)

Basic database design and introduction to structured query language (SQL). Includes instruction on creating user interface forms for a database. *Prerequisites:* CSCI 1336 and CSCI 1136.

3352. Mobile Application Development. 3(3-0)

This course introduces the student to the concepts, principles, and development in the major platforms including iOS, Android, and Windows. Its objective is to provide students with the tools and knowledge necessary to create applications that can run on mobile and/or smart devices. Differences between mobile and desktop computing will be investigated, sample mobile apps will be dissected, and tool suites for the development of mobile software will be covered. *Prerequisites:* CSCI 1336 and CSCI 1136.

3355. COBOL Programming II. 3(3-0)

Refinement and expansion of programming competencies in the COBOL language including structured programming, sorting, merging, file systems and access methods. *Prerequisites:* CSCI 1336, CSCI 1136 and CISA 2354.

3356. Systems Analysis and Design. 3(3-0)

Analysis and design techniques required for implementing medium to large-scale computer information systems. Development of requirements for personnel, software and equipment for typical applications.

3358. Management Information Systems. 3(3-0)

A comprehensive study of the use of information technology as an organizational resource, including the implementation of disciplined processes and management development to effectively exploit the power of modern information technology. This course is specifically designed for non-computer information systems majors. *Prerequisites:* CISA 1305 or CSCI 1336.

3367. Advanced Microcomputer Applications and Systems. 3(3-0)

Study of advanced microcomputer hardware and software technologies having application in business administration. *Prerequisites:* CSCI 1336.

4101. Jaguar Tracks IV: Computer Information Systems. 1(1-0)

In this course, students will identify the various ethical issues and values as it relates to future careers within their discipline. Students will study various cases and identify the ethical issues, and seek mechanisms for addressing and resolving the issues. Through mock debates, studying, writing and presenting professional ethical analysis studies, students will be prepared to understand and address the ethical issues within their discipline. *Prerequisites:* CISA 3101 or 90 or more earned academic semester credit hours.

4303. Client/Server Application Development. 3(3-0)

Client/Server application development practices and tools. Emphasis on developing distributed database applications that support the information processing needs of business. Topics include: object-oriented program design, programming with object-oriented development platforms and the use of embedded Structured Query Language for database transaction processing. *Prerequisites:* CSCI 1336 and CSCI 1136.

4312. Risk Management. 3(3-0)

This course is an overview of the basic components of risk as they pertain to technical projects. Topics include risk identification, risk impact analysis, risk response planning, mitigating risk, and risk management techniques. *Prerequisites:* CISA 3311 and Senior standing.

4313. Programming for Data Analytics. 3(3-0)

This course introduces students to a common scripting language used in data analytics. Students will explore the latest tools techniques to help tackle the world of data acquisition and analysis. Students will review topics like scientific computing, data manipulation, machine learning, Textual Data Analysis, and Data Visualization. *Prerequisite:* CSCI 1337, CSCI 1137.

4322. Information Policy Assurance. 3(3-0)

This course explores information security policies. The course includes both sociological and psychological issues in policy implementation in general, a dialogue on information security specific policies, the structure of a policy, and the lifecycle of policy from creation to enactment. The course also exposes the student to issue specific policies in different domains of security to assist the students learn in context of real life situations. *Prerequisites:* CISA 3321.

4323. Computer Forensics. 3(3-0)

This course is an overview of the methods and tools utilized for collecting and preserving electronic digital evidence for the computer forensic process. Topics include the forensic examination, analysis, and report writing; and preparing for courtroom testimony about the forensic results. *Prerequisites:* CISA 3321.

4324. Security Risk Analysis. 3(3-0)

This course examines concepts of risk analysis, risks in engineered systems, environmental risks, security risks; methods of risk analysis, fault trees and event trees. Students will study risk assessment using penetration testing methods. *Prerequisites:* CISA 3321.

4326. Security and Operation Project. 3(3-0)

This course combines the theoretical foundation of system security with hands-on practical application on real systems. Students will practice roles of network and system administrators and system architects from both security and business operations perspectives. Meets College of Business Experiential Learning Requirements. *Prerequisites:* CISA 4324 or CISA 3325.

4331. Enterprise Resource Planning Systems. 3(3-0)

This course examines the concepts, principles, and applications of Enterprise Resource Planning (ERP) systems. This course helps students understand the key processes of business organizations. It also improves the student's understanding of how key business processes are managed and integrated in enterprise level software used by large organizations. *Prerequisites:* Senior Standing

4332. Business Intelligence/Data Mining. 3(3-0)

This course provides an integrative foundation in the field of business intelligence and data mining. It focuses on business data warehousing, multidimensional data modeling, online analytic processing, business reporting and planning, and data mining. *Prerequisites:* CISA 3351.

4333. Supply Chain Integration. 3(3-0)

Supply chain management is the successful cross-functional integration of key business processes from the original suppliers of products, services, and information through the firm to its customers and stakeholders with an emphasis on value-added benefits. This course emphasizes the use of information technology in the supply chain management process. *Prerequisites:* Senior standing.

4334. Business Process Integration. 3(3-0)

This course provides a foundation for information system professionals who are often called upon to configure and integrate business processes. Information system professionals are often called upon to install and configure computer information systems including packages such as SAP. They must also demonstrate an understanding of how data is shared throughout the organization. This course helps students understand the key processes of business organizations. It also improves the student's understanding of how key business processes are managed and integrated in enterprise level software used by large organizations. *Prerequisites:* CISA 4331.

4335. ABAP SAP Programming. 3(3-0)

This course will introduce the student to the concepts, principles, and development in programming in ABAP. Its objective is to provide students with the tools and knowledge necessary to create applications that can run on mobile and/or smart devices. *Prerequisites:* CSCI 1336 and CSCI 1136.

4358. Senior Project and Seminar. 3(3-0)

This course will introduce the student to the concepts, principles, and applications of information systems technology in the business environment, including a study of organizational structure, management and personnel of a data center, and the planning, organizing, and control activities necessary for good management of the information systems resource. Students will also complete an information system development project. Meets College of Business Experiential Learning Requirements. *Prerequisites:* CISA 3351, CISA 3356.

4359. Advanced Problems in Computer Information Systems. 3(3-0)

Research in selected fields of computer information systems. Prerequisite: consent of instructor. May be repeated once for additional credit. *Prerequisites:* CSCI 1336, CSCI 1136 and Senior standing.

CISA Graduate Courses

5309. Computer Tech Applications. 3(3-0)

Study of databases, enterprise systems, decision support systems, business intelligence, and IS security from a managerial standpoint. The course provides insights on systems used for collecting data to assist with operational and strategic decision making.

5310. Organization and Management of Business Databases. 3(3-0)

A study of important issues in the design and implementation of databases for business enterprises with emphasis on the relational model. Study of non-relational database models such as object-oriented, hierarchical and network. Hands-on experience will be provided using a current relational database product. *Prerequisite:* CISA 5309 or permission of the instructor.

5311. Project Management. 3(3-0)

This course examines the concepts, principles, and applications of project management in the business environment, including the study of project management procedures, project management tools, organizational structure, management of project team members, and the planning, organizing, and control activities necessary for good project. Cross-listed with MGMT 5311.

5312. Risk Management. 3(3-0)

This course is an overview of the basic components of risk as they pertain to technical projects. Topics include risk identification, risk impact analysis, risk response planning, mitigating risk, and risk management techniques. Cross- listed with MGMT 5312. *Prerequisite:* CISA 5311 or MGMT 5311.

5320. Decision Support Systems. 3(3-0)

A study of computer-based systems that support unstructured and semi-structured decision-making by individuals or groups. These systems include: decision support systems, group decision support systems, executive information systems and expert systems. *Prerequisite:* CISA 5309 or permission of the instructor.

5321. Information Security. 3(3-0)

This course is an overview of the basic components of risk as they pertain to technical projects. Topics include risk identification, risk impact analysis, risk response planning, mitigating risk, and risk management techniques. Prerequisite CISA 5330 or undergraduate equivalent in telecommunications or computer networks.

5322. Information Policy Assurance. 3(3-0)

This course explores information security policies. The course includes both sociological and psychological issues in policy implementation in general, a dialogue on information security specific policies, the structure of a policy, and the lifecycle of policy from creation to enactment. The course also exposes the student to issue specific policies in different domains of security to assist the students learn in context of real life situations. *Prerequisite:* CISA 5330 and CISA 5321.

5323. Computer Forensics. 3(3-0)

This course is an overview of the methods and tools utilized for collecting and preserving electronic digital evidence for the computer forensic process. Topics include the forensic examination, analysis, and

report writing; and preparing for courtroom testimony about the forensic results. *Prerequisite:* CISA 4321 or CISA 5321.

5324. Risk Analysis. 3(3-0)

This course examines concepts of risk analysis, risks in engineered systems, environmental risks, security risks; methods of risk analysis, fault trees and event trees; quantification of probabilities, use of data, models, and expert judgements; risks and decisions, interlinking risk analysis with risk management; applications to homeland security decisions. *Prerequisite:* CISA 4306 or CISA 5330.

5325. Network Security. 3(3-0)

The course explores mechanisms for protecting networks against attacks with an emphasis placed on network security applications for the Internet and corporate networks. The course also investigates various networking security standards and explores methods for enforcing and enhancing those standards. *Prerequisite:* CISA 4306 or CISA 5330.

5326. Security and Operations Practicum. 3(3-0)

This course combines the theoretical foundation of system security with hands-on practical application on real systems. Students will practice roles of network and system administrators and system architects from both security and business operations perspectives. In addition, students will design and build a small network with DMZ and internal subnet systems. *Prerequisites:* CISA 5330 or undergraduate equivalent in telecommunications or computer networks, CISA 5321, and CISA 5324 or CISA 5325.

5330. Telecommunications. 3(3-0)

A study of concepts, principles and technologies allowing the integration of information and telecommunications systems to support the internal and external activities of business enterprises.

5331. Enterprise Resource Planning Systems. 3(3-0)

This course examines the concepts, principles, and applications of Enterprise Resource Planning (ERP) systems. This course helps students understand the key processes of business organizations. It also improves the student's understanding of how key business processes are managed and integrated in enterprise level software used by large organizations. Cross-listed with ACCT 5307. *Prerequisite:* CISA 5309.

5332. Business Intelligence/Data Mining. 3(3-0)

This course provides an integrative foundation in the field of business intelligence and data mining. It focuses business data warehousing multidimensional data modeling, online analytic processing, business reporting and planning, data mining, along with other advanced topics relevant to the field of business intelligence. *Prerequisite:* CISA 5309.

5333. Supply Chain Integration. 3(3-0)

Supply chain management is the successful cross-functional integration of key business processes from the original suppliers of products, services, and information through the firm to its customers and stakeholders with an emphasis on value-added benefits. This course emphasizes the use of information technology in the supply chain management process. Cross-listed with MGMT 5333.

5334. Business Process Integration. 3(3-0)

The course provides a foundation for information system professionals who are often called upon to configure and integrate business processes. Information system professionals are often called upon to install and configure computer information systems including packages such as SAP. They must also demonstrate an understanding of how data is shared throughout the organization. This course helps students understand the key processes of business organizations. It also improves the student's

understanding of how key business processes are managed and integrated in enterprise level software used by large organizations. *Prerequisite:* CISA 5309 and CISA 5331.

5340. Systems Analysis, Design and Implementation. 3(3-0)

A study of systems analysis, design and implementation techniques that can be used to analyze and improve or create organizational information and communications systems.

5359. Special Problems in Computer Information Systems. 3(3-0)

Study, research or internship in CISA. May be repeated once for credit.

Cyber Engineering Technology (CETE) Courses

CETE 3370 Cloud Computing Infrastructure and Security. This course introduces the cloud computing reference model for building cloud infrastructure. This model includes five fundamental layers (physical, virtual, control, orchestration, and service) and three cross-layer functions (business continuity, security, and service management). For each layer and cross-layer function, this course covers the comprising technologies, components, processes, and mechanisms. This course takes an open-approach to describe the concepts and technologies, and addresses the security issues associated with cloud computing infrastructure. *Prerequisite:* CSCI 3344.

CETE 4375 Wireless and Mobile Security. This course examines the concepts, principles, and application of wireless and mobile security. It discusses the evolution of wireless and mobile technology and explores security and privacy including risks, threats, vulnerabilities, and security mechanisms to address security threats in wireless and mobile devices, Internets, and internetworking systems. *Prerequisite:* CISA 2306.

CETE 4380 Applied Cryptosystems. This course begins with an overview of necessary background in algebra and number theory, private- and public-key cryptosystems, applied cryptography, and basic signature schemes. The course will cover number theory and basic theory of Galois fields used in cryptography; history of primality algorithms and the polynomial-time test of primality; discrete logarithm based cryptosystems including those based on elliptic curves; interactive protocols including the role of zero-knowledge proofs in authentication; construction of untraceable electronic cash on the net; and quantum cryptography, and one or more of digital watermarking, fingerprinting and Steganography. *Prerequisite:* CSCI 3321.

CETE 4481 Penetration Testing Lab Using Python. This course will introduce Python programming language for information and cyber security applications. Students will learn how to write Python codes for different subjects including: socket communication, web security and testing, penetration testing, ethical hacking tools and applications, encryption, operating system communication and APIs, etc. *Prerequisite:* CSCI 1337 and CSCI 1137.

CETE 4385 Cyber Security Architecture. This course will cover subjects related to security design and architecture. The course links to a new job role called: Security architect. A Security architect designs, builds and oversees the implementation of network and computer security for an organization. The course will be built based on NIST NICE Cyber framework. *Prerequisite:* CSCI 3321.

CETE 4390 Cyber Physical Systems Security. This course prepares students to securely design and operate physical systems with embedded software and firmware. Topics include, but are not limited to, the Internet of Things (IoT), industrial control systems, and ground, air and maritime vehicles. Cyber physical systems pose unique life safety risks to system users and the public, while the rapidly expanding role of IoT is introducing new security and privacy risks to the public. Methods to assess and mitigate risk from cyber physical systems are examined. *Prerequisite:* CSCI 3321.

CETE 4392 Big Data Analytics and Security. This course will introduce students to the concepts, principles, and application of big data analytics in the context of security. It will provide knowledge on big data analytics tools and platforms including MapReduce, Hadoop, and explore the applicability of big data analysis to identify security threats and to develop intelligent security solutions for securing software applications and business processes. *Prerequisite:* CSCI 2436.

CETE 4394 Cyber Intelligence. This course will integrate knowledge from introductory security courses with knowledge from data science and analytics. Major subjects include: Cyber operations and management, cyber defense and offense, malware analysis, and reverse engineering. The course will be built based on NIST NICE Cyber framework. *Prerequisite:* CSCI 3321.

CETE 4396 Internship in Cyber Engineering Technology. An off-campus learning experience allowing the acquisition and application of cyber engineering technology skills in an actual work setting.
Prerequisite: Senior standing and department chair permission.