DEPARTMENT OF INFORMATION SYSTEMS AND CYBER SECURITY

Mission Statement
The mission of the Department of Information Systems and Cyber Security is to offer graduate and undergraduate programs of high quality. The programs meet the needs of students preparing for professional careers in the fields of information systems or cyber security. This mission includes providing a broad-based education through the university’s core curriculum as well as education in current business and information systems or cyber security topics.

The department is responsive to the needs of employers and other constituents of its programs. The department is aware of rapid changes to the technology. We incorporate these changes into the curriculum as is practical. The faculty assist in accomplishing the departmental mission through a planned integration of contributions in teaching, intellectual contributions and service.

The Department of Information Systems and Cyber Security offers two undergraduate degree programs: one with a major in Information Systems and one with a major in Cyber Security (which is also offered 100 percent online). For admission requirements for the online B.B.A. degree in Cyber Security, please visit https://go.online.utsa.edu/cybersecurity/. The Department offers minors in Cyber Security, Digital Forensics, Information Systems, and Network and Data Center Management which are open to all majors in the University. In addition, the Department offers a minor in Technology Management for nonbusiness majors. A Certificate in Pathogenic Outbreak Investigations is also offered in collaboration with the Departments of Biology and Computer Science in the College of Sciences.

- B.B.A. degree in Information Systems (p. 1)
- B.B.A. degree in Cyber Security (p. 3)

Bachelor of Business Administration Degree in Information Systems
The minimum number of semester credit hours for the Bachelor of Business Administration (B.B.A.) degree in Information Systems is 120, at least 39 of which must be at the upper-division level.

All candidates seeking this degree must fulfill the Core Curriculum requirements, the Common Body of Knowledge (CBK) requirements, and the degree requirements, which are listed below.

Core Curriculum Requirements (42 semester credit hours)
Students seeking the B.B.A. degree in Information Systems must fulfill University Core Curriculum requirements in the same manner as other students.

MAT 1053 and MAT 1133 may be used to satisfy both Core Curriculum requirements and Common Body of Knowledge (CBK) requirements.

All degrees in the College of Business require 120 hours. If students elect to take a course that satisfies both a Core and CBK requirement, students may need to take an additional course to meet the 120 hours.

Core Curriculum Component Area Requirements (http://catalog.utsa.edu/undergraduate/bachelorsdegreeregulations/degreerequirements/corecurriculumcomponentarearequirements/)

| First Year Experience Requirement | 3 |
| Communication                     | 6 |
| Mathematics                       | 3 |
| Life and Physical Sciences        | 6 |
| Language, Philosophy and Culture  | 3 |
| Creative Arts                     | 3 |
| American History                  | 6 |
| Government-Political Science      | 6 |
| Social and Behavioral Sciences    | 3 |
| Component Area Option             | 3 |
| **Total Credit Hours**            | **42** |

Common Body of Knowledge (CBK)
All students seeking a B.B.A. degree in the College of Business must complete the following Common Body of Knowledge (CBK) courses in addition to the Core Curriculum.

| ACC 2013 Principles of Accounting I | 3 |
| ACC 2033 Principles of Accounting II | 3 |
| COM 1053 or COM 1063 Business and Professional Speech Digital Communication | 3 |
| ECO 2013 Introductory Macroeconomics | 3 |
| ECO 2023 Introductory Microeconomics (satisfies Social and Behavioral Sciences Core Curriculum requirement) | 3 |
| FIN 3013 Principles of Business Finance | 3 |
| GBA 2013 Legal, Social and Ethical Issues in Business | 3 |
| IS 1403 or IS 1413 Business Information Systems Fluency Excel for Business Information Systems | 3 |
| IS 3003 Principles of Information Systems for Management | 3 |
| MAT 1133 Calculus for Business (satisfies Mathematics Core Curriculum requirement, Actuarial Science majors must take MAT 1214 in lieu of MAT 1133) | 3 |
| MGT 3003 Business Communication and Professional Development | 3 |
| MGT 3013 Introduction to Organization Theory, Behavior, and Management | 3 |
| MGT 4893 Management Strategy (taken in semester of graduation) | 3 |
| MKT 3013 Principles of Marketing | 3 |
| MS 1023 Business Statistics with Computer Applications I (Actuarial Science majors must take STA 3003 in lieu of MS 1023) | 3 |
| MS 3043 Business Statistics with Computer Applications II (Actuarial Science majors must take STA 3513 in lieu of MS 3043) | 3 |
| MS 3053 Management Science and Operations Technology | 3 |
Note: Students majoring in Accounting, Actuarial Science, Economics, Finance, Management Science, Business Analytics, and Statistics and Data Science are strongly encouraged to select IS 1413 Excel for Business Information Systems.

In addition to the Core Curriculum requirements and the College of Business Common Body of Knowledge (CBK), all candidates for the degree must complete the following degree requirements.

Gateway Course
Students pursuing the B.B.A. degree in Information Systems must successfully complete the following Gateway Course with a grade of "C-" or better in no more than two attempts. A student who is unable to successfully complete this course within two attempts, including dropping the course with a grade of "W", or by taking an equivalent course at another institution, will be required to change his or her major.

MAT 1053  Mathematics for Business  3

Degree Requirements
A. Major Requirements  24

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 1003</td>
<td>Unlocking Cyber</td>
<td>3</td>
</tr>
<tr>
<td>IS 2053</td>
<td>Programming Languages I with Scripting</td>
<td></td>
</tr>
<tr>
<td>IS 2063</td>
<td>Programming Languages II with Java</td>
<td></td>
</tr>
<tr>
<td>IS 3063</td>
<td>Database Management for Information Systems</td>
<td></td>
</tr>
<tr>
<td>IS 3073</td>
<td>Application Development</td>
<td></td>
</tr>
<tr>
<td>IS 3413</td>
<td>Introduction to Telecommunications for Business</td>
<td></td>
</tr>
<tr>
<td>IS 4053</td>
<td>Systems Analysis and Design</td>
<td></td>
</tr>
<tr>
<td>IS 4063</td>
<td>Advanced Topics in Information Systems</td>
<td></td>
</tr>
</tbody>
</table>

B. Support Work in Major  9

Students not selecting a track must complete 9 semester credit hours of upper-division IS courses which may include only ONE of the following two course choices:

MOT 4023  Essentials of Technology Management or MOT 4143! Introduction to Project Management

IT Project Management Track
Choose three courses from the list below:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 4083</td>
<td>Agile Project Management</td>
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<tr>
<td>MOT 4023</td>
<td>Essentials of Technology Management</td>
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<tr>
<td>MOT 4143</td>
<td>Introduction to Project Management</td>
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</tr>
<tr>
<td>MOT 4153</td>
<td>Project Management Certification</td>
<td></td>
</tr>
<tr>
<td>MOT 4203</td>
<td>Strategic Management of Technology and Innovation</td>
<td></td>
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</table>

Cyber Analytics Track
Choose three courses from the list below:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 4023</td>
<td>Applied Big Data with Machine Learning</td>
<td></td>
</tr>
<tr>
<td>IS 4183</td>
<td>Advanced Database Concepts and Applications</td>
<td></td>
</tr>
<tr>
<td>IS 4233</td>
<td>Introduction to Cloud Computing</td>
<td></td>
</tr>
<tr>
<td>IS 4483</td>
<td>Digital Forensic Analysis I</td>
<td></td>
</tr>
<tr>
<td>IS 4533</td>
<td>Malware Analysis</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours  33

Course Sequence Guide for B.B.A. Degree in Information Systems
This course sequence guide is designed to assist students in completing their UTSA undergraduate business degree requirements. This is a term-by-term sample course guide. Students must satisfy other requirements in their catalog and meet with their academic advisor for an individualized degree plan. Progress within this guide depends upon such factors as course availability, individual student academic preparation, student time management, work obligations, and individual financial considerations. Students may choose to take courses during Summer terms to reduce course loads during long semesters.

Recommended Four-Year Academic Plan

<table>
<thead>
<tr>
<th>Semester</th>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AIS 1203  Academic Inquiry and Scholarship (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MAT 1053  Mathematics for Business (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>WRC 1013  Freshman Composition I (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 1003  Unlocking Cyber ((major))</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Spring</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAT 1133  Calculus for Business (core and CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>WRC 1023  Freshman Composition II (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 1403  or IS 1413  Business Information Systems or Excel for Business Information Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 2053  Programming Languages I with Scripting (major)</td>
<td>3</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Second Year</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>ACC 2013  Principles of Accounting I (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECO 2023  Introductory Microeconomics (core and CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 2063  Programming Languages II with Java (major)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MS 1023  Business Statistics with Computer Applications I (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>COM 1053  Business and Professional Speech (CBK) or Digital Business Communication</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Spring</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACC 2033  Principles of Accounting II (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECO 2013  Introductory Macroeconomics (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 3003  Principles of Information Systems for Management (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MS 3043  Business Statistics with Computer Applications II (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MGT 3003  Business Communication and Professional Development (CBK)</td>
<td>3</td>
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</table>

Total Credit Hours  120
### Third Year

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>IS 3063</td>
<td>Database Management for Information Systems (major)</td>
<td>3</td>
</tr>
<tr>
<td>IS 3413</td>
<td>Introduction to Telecommunications for Business (major)</td>
<td>3</td>
</tr>
<tr>
<td>MS 3053</td>
<td>Management Science and Operations Technology (CBK)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Core Curriculum Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life &amp; Physical Sciences (core)</td>
<td>3</td>
</tr>
<tr>
<td>Language, Philosophy &amp; Culture (core)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN 3013</td>
<td>Principles of Business Finance (CBK)</td>
<td>3</td>
</tr>
<tr>
<td>IS 3073</td>
<td>Application Development (major)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Upper-division IS elective (3XXX or 4XXX level) (support work in major) | 3 |

<table>
<thead>
<tr>
<th>Core Curriculum Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life &amp; Physical Sciences (core)</td>
<td>3</td>
</tr>
<tr>
<td>Creative Arts (core)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Fourth Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBA 2013</td>
<td>Legal, Social and Ethical Issues in Business (CBK)</td>
<td>3</td>
</tr>
<tr>
<td>IS 4053</td>
<td>Systems Analysis and Design (major)</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3013</td>
<td>Introduction to Organization Theory, Behavior, and Management (CBK)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Upper-division IS elective (3XXX or 4XXX level) (support work in major) | 3 |

<table>
<thead>
<tr>
<th>Core Curriculum Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government-Political Science (core)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 4063</td>
<td>Advanced Topics in Information Systems (major)</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4893</td>
<td>Management Strategy (CBK)</td>
<td>3</td>
</tr>
<tr>
<td>MKT 3013</td>
<td>Principles of Marketing (CBK)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Upper-division IS elective (3XXX or 4XXX level) (support work in major) | 3 |

<table>
<thead>
<tr>
<th>Core Curriculum Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government-Political Science (core)</td>
<td>3</td>
</tr>
</tbody>
</table>

All candidates seeking this degree must fulfill the Core Curriculum requirements, the Common Body of Knowledge (CBK) requirements, and the degree requirements, which are listed below.

### Core Curriculum Requirements (42 semester credit hours)

Students seeking the B.B.A. degree in Cyber Security must fulfill University Core Curriculum requirements in the same manner as other students.

MAT 1053 and MAT 1133 should be used to satisfy the core requirement in Mathematics (O20) and the core requirement in the Component Area Option (O90). ECO 2023 should be used to satisfy the core requirement in Social and Behavioral Sciences (O80).

MAT 1133 and ECO 2023 may be used to satisfy both Core Curriculum requirements and Common Body of Knowledge (CBK) requirements.

All degrees in the College of Business require 120 hours. If students elect to take a course that satisfies both a Core and COB requirement, students may need to take an additional course to meet the 120 hours.

### Common Body of Knowledge (CBK)

All students seeking a B.B.A. degree in the College of Business must complete the following Common Body of Knowledge (CBK) courses in addition to the Core Curriculum.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 2013</td>
<td>Principles of Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>ACC 2033</td>
<td>Principles of Accounting II</td>
<td>3</td>
</tr>
<tr>
<td>COM 1053</td>
<td>Business and Professional Speech</td>
<td>3</td>
</tr>
<tr>
<td>or COM 1063</td>
<td>Digital Business Communication</td>
<td>3</td>
</tr>
<tr>
<td>ECO 2013</td>
<td>Introductory Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECO 2023</td>
<td>Introductory Microeconomics (satisfies Social and Behavioral Sciences Core Curriculum requirement)</td>
<td>3</td>
</tr>
<tr>
<td>FIN 3013</td>
<td>Principles of Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>GBA 2013</td>
<td>Legal, Social and Ethical Issues in Business</td>
<td>3</td>
</tr>
<tr>
<td>IS 1403</td>
<td>Business Information Systems Fluency</td>
<td>3</td>
</tr>
<tr>
<td>or IS 1413</td>
<td>Excel for Business Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>IS 3003</td>
<td>Principles of Information Systems for Management</td>
<td>3</td>
</tr>
<tr>
<td>MAT 1133</td>
<td>Calculus for Business (satisfies Mathematics Core Curriculum requirement, Actuarial Science majors must take MAT 1214 in lieu of MAT 1133)</td>
<td>3</td>
</tr>
</tbody>
</table>

### Bachelor of Business Administration Degree in Cyber Security

The minimum number of semester credit hours for the Bachelor of Business Administration (B.B.A.) degree in Cyber Security is 120, at least 39 of which must be at the upper-division level.

1 College of Business students should take MAT 1133 and ECO 2023 to satisfy both Core Curriculum and CBK requirements.
MGT 3003  Business Communication and Professional Development  3
MGT 3013  Introduction to Organization Theory, Behavior, and Management  3
MGT 4893  Management Strategy (taken in semester of graduation)  3
MKT 3013  Principles of Marketing  3
MS 1023  Business Statistics with Computer Applications I (Actuarial Science majors must take STA 3003 in lieu of MS 1023)  3
MS 3043  Business Statistics with Computer Applications II (Actuarial Science majors must take STA 3513 in lieu of MS 3043)  3
MS 3053  Management Science and Operations Technology  3

Note: Students majoring in Accounting, Actuarial Science, Economics, Finance, Management Science, Business Analytics, and Statistics and Data Science are strongly encouraged to select IS 1413 Excel for Business Information Systems.

In addition to the Core Curriculum requirements and the College of Business Common Body of Knowledge (CBK), all candidates for the degree must complete the following degree requirements.

Gateway Course
Students pursuing the B.B.A. degree in Cyber Security must successfully complete the following Gateway Course with a grade of "C-" or better in no more than two attempts. A student who is unable to successfully complete this course within two attempts, including dropping the course with a grade of "W", or by taking an equivalent course at another institution, will be required to change his or her major.

MAT 1053  Mathematics for Business  3

Degree Requirements

A. Major Requirements  24
IS 1003  Unlocking Cyber
IS 2053  Programming Languages I with Scripting
IS 2063  Programming Languages II with Java
IS 3033  Operating Systems Security
IS 3413  Introduction to Telecommunications for Business
IS 3423  Network Security
IS 3513  Information Assurance and Security
IS 3523  Intrusion Detection and Incident Response

B. Support Work in Major  9

Non-Track
Choose 3 courses from the list below:
IS 3043  Secure Mobile App Development
IS 3433  Introduction to Digital Forensics
IS 3453  Networking Fundamentals
IS 3533  Cyber Law and Legal System
IS 3833  Cyber Operations
IS 4033  Network Operations
IS 4143  Wide Area Networks
IS 4223  Emerging Network Technologies
IS 4463  Web Application Security
IS 4473  Information Assurance Policy
IS 4483  Digital Forensic Analysis I
IS 4513  Industrial Control Systems
IS 4523  Digital Forensic Analysis II
IS 4533  Malware Analysis
IS 4543  Cyber Attack and Defend

Cyber Operator Track (9 semester credit hours)
Choose 3 courses from the list below:
IS 3453  Networking Fundamentals
IS 3833  Cyber Operations
IS 4533  Malware Analysis
IS 4543  Cyber Attack and Defend

Cyber Policy and Strategy Planner Track (9 semester credit hours)
Choose 3 courses from the list below:
IS 3533  Cyber Law and Legal System
IS 4223  Emerging Network Technologies
IS 4473  Information Assurance Policy
IS 4023  Essentials of Technology Management

Forensics Analyst Track (9 semester credit hours)
Choose 3 courses from the list below:
IS 3433  Introduction to Digital Forensics
IS 4483  Digital Forensic Analysis I
IS 4523  Digital Forensic Analysis II
IS 4533  Malware Analysis

Network Operations Specialist Track (9 semester credit hours)
Choose 3 courses from the list below:
IS 3453  Networking Fundamentals
IS 4033  Network Operations
IS 4143  Wide Area Networks
IS 4513  Industrial Control Systems

Secure Software Developer Track (9 semester credit hours)
Choose 3 courses from the list below:
IS 3043  Secure Mobile App Development
IS 4083  Agile Project Management
IS 4483  Digital Forensic Analysis I
IS 4523  Digital Forensic Analysis II
IS 4533  Malware Analysis

Total Credit Hours  33

Course Sequence Guide for B.B.A. Degree in Cyber Security

This course sequence guide is designed to assist students in completing their UTSA undergraduate business degree requirements. This is a term-by-term sample course guide. Students must satisfy other requirements in their catalog and meet with their academic advisor for an individualized degree plan. Progress within this guide depends upon such factors as course availability, individual student academic preparation, student time management, work obligations, and individual financial...
considerations. Students may choose to take courses during Summer terms to reduce course loads during long semesters.

**Recommended Four-Year Academic Plan**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AIS 1203 Academic Inquiry and Scholarship (core)</td>
<td>3</td>
</tr>
<tr>
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<td>MAT 1053 Mathematics for Business (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>WRC 1013 Freshman Composition I (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 1003 Unlocking Cyber (major)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>American History (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credit Hours</strong></td>
<td>15</td>
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<tr>
<td></td>
<td><strong>Spring</strong></td>
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<tr>
<td></td>
<td>ECO 2023 Introductory Microeconomics (core and CBK)</td>
<td>3</td>
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<td>IS 1403 or IS 1413 Business Information Systems Fluency (CBK)</td>
<td>3</td>
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<tr>
<td></td>
<td>or Excel for Business Information Systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IS 2053 Programming Languages I with Scripting (major)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MAT 1133 Calculus for Business (core and CBK)</td>
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<tr>
<td></td>
<td>WRC 1023 Freshman Composition II (core)</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Credit Hours</strong></td>
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</tr>
<tr>
<td>Second Year</td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACC 2013 Principles of Accounting I (CBK)</td>
<td>3</td>
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<tr>
<td></td>
<td>ECO 2013 Introductory Macroeconomics (CBK)</td>
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<td></td>
<td>COM 1053 or COM 1063 Business and Professional Speech (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or Digital Business Communication</td>
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<tr>
<td></td>
<td>IS 2063 Programming Languages II with Java (major)</td>
<td>3</td>
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<tr>
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<td><strong>Life &amp; Physical Sciences (core)</strong></td>
<td>3</td>
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<td><strong>Credit Hours</strong></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>Spring</strong></td>
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</tr>
<tr>
<td></td>
<td>ACC 2033 Principles of Accounting II (CBK)</td>
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<tr>
<td></td>
<td>IS 3003 Principles of Information Systems for Management (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 3413 Introduction to Telecommunications for Business (major)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MS 1023 Business Statistics with Computer Applications I (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Life &amp; Physical Sciences (core)</strong></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credit Hours</strong></td>
<td>15</td>
</tr>
<tr>
<td>Third Year</td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IS 3033 Operating Systems Security (major)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IS 3513 Information Assurance and Security (major)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credit Hours</strong></td>
<td>15</td>
</tr>
<tr>
<td>Fourth Year</td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MGT 3013 Introduction to Organization Theory, Behavior, and Management (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MS 3053 Management Science and Operations Technology (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Upper-division IS elective (support work in major) (must be approved Cyber Security content)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Government-Political Science (core)</strong></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credit Hours</strong></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>Spring</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MGT 4893 Management Strategy (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MKT 3013 Principles of Marketing (CBK)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Upper-division IS elective (support work in major) (must be approved Cyber Security content)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>American History (core)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Creative Arts (core)</strong></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credit Hours</strong></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credit Hours</strong></td>
<td>120</td>
</tr>
</tbody>
</table>

1. College of Business students should take MAT 1133 and ECO 2023 to satisfy both Core Curriculum and CBK requirements.

- Minor in Cyber Security (p. 5)
- Minor in Digital Forensics (p. 6)
- Minor in Information Systems (p. 6)
- Minor in Network and Data Center Management (p. 6)
- Minor in Technology Management for Nonbusiness Majors (p. 6)

**Minor in Cyber Security**

The Minor in Cyber Security is open to all majors in the University. A student majoring in Information Systems will be required to take 18 semester credit hours of coursework. Other majors may be required to take additional hours depending on their academic background.

**A. Required courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 3413</td>
<td>Introduction to Telecommunications for Business</td>
<td>3</td>
</tr>
</tbody>
</table>
# Minor in Cyber Security

The Minor in Cyber Security is open to all majors in the University. A student majoring in Information Systems or Cyber Security will be required to take 18 semester credit hours of coursework. Other majors may be required to take additional hours depending on their academic background.

## Required courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 3423</td>
<td>Network Security</td>
<td></td>
</tr>
<tr>
<td>IS 3513</td>
<td>Information Assurance and Security</td>
<td></td>
</tr>
<tr>
<td>IS 3523</td>
<td>Intrusion Detection and Incident Response</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 18

To declare a Minor in Cyber Security, obtain advice, or seek approval of course substitutions for course requirements, students must consult their academic advisor.

# Minor in Digital Forensics

The Minor in Digital Forensics is open to all majors in the University. A student majoring in Information Systems and Cyber Security will be required to take 18 semester credit hours of coursework. Other majors may be required to take additional hours depending on their academic background.

## Required courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 3433</td>
<td>Introduction to Digital Forensics</td>
<td></td>
</tr>
<tr>
<td>IS 3513</td>
<td>Information Assurance and Security</td>
<td></td>
</tr>
<tr>
<td>IS 3523</td>
<td>Intrusion Detection and Incident Response</td>
<td></td>
</tr>
<tr>
<td>IS 3533</td>
<td>Cyber Law and Legal System</td>
<td></td>
</tr>
<tr>
<td>IS 3833</td>
<td>Cyber Operations</td>
<td></td>
</tr>
<tr>
<td>IS 4033</td>
<td>Network Operations</td>
<td></td>
</tr>
<tr>
<td>IS 4083</td>
<td>Agile Project Management</td>
<td></td>
</tr>
<tr>
<td>IS 4143</td>
<td>Wide Area Networks</td>
<td></td>
</tr>
<tr>
<td>IS 4223</td>
<td>Emerging Network Technologies</td>
<td></td>
</tr>
<tr>
<td>IS 4463</td>
<td>Web Application Security</td>
<td></td>
</tr>
<tr>
<td>IS 4473</td>
<td>Information Assurance Policy</td>
<td></td>
</tr>
<tr>
<td>IS 4483</td>
<td>Digital Forensic Analysis I</td>
<td></td>
</tr>
<tr>
<td>IS 4513</td>
<td>Industrial Control Systems</td>
<td></td>
</tr>
<tr>
<td>IS 4523</td>
<td>Digital Forensic Analysis II</td>
<td></td>
</tr>
<tr>
<td>IS 4533</td>
<td>Malware Analysis</td>
<td></td>
</tr>
<tr>
<td>IS 4543</td>
<td>Cyber Attack and Defend</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 18

To declare a Minor in Digital Forensics, obtain advice, or seek approval of course substitutions for course requirements, students must consult their academic advisor.

# Minor in Network and Data Center Management

The Minor in Network and Data Center Management is open to all majors in the University. A student majoring in Information Systems or Cyber Security will be required to take 21 semester credit hours of coursework. Other majors may be required to take additional hours depending on their academic background.

## Required courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 3453</td>
<td>Networking Fundamentals</td>
<td></td>
</tr>
<tr>
<td>IS 3513</td>
<td>Information Assurance and Security</td>
<td></td>
</tr>
<tr>
<td>IS 3523</td>
<td>Intrusion Detection and Incident Response</td>
<td></td>
</tr>
<tr>
<td>IS 4033</td>
<td>Network Operations</td>
<td></td>
</tr>
<tr>
<td>IS 4213</td>
<td>Data Center Infrastructure Planning</td>
<td></td>
</tr>
<tr>
<td>IS 4223</td>
<td>Emerging Network Technologies</td>
<td></td>
</tr>
<tr>
<td>MOT 4143</td>
<td>Introduction to Project Management</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 21

To declare a Minor in Network and Data Center Management, obtain advice, or seek approval of course substitutions for course requirements, students must consult with their academic advisor.

# Minor in Technology Management for Nonbusiness Majors

The Minor in Technology Management for Nonbusiness Majors is only open to nonbusiness majors in the University. The number of required semester credit hours for this minor is 18.

## A. Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 2003</td>
<td>Foundations of Accounting</td>
<td></td>
</tr>
<tr>
<td>FIN 3003</td>
<td>Survey of Finance</td>
<td></td>
</tr>
<tr>
<td>MKT 3013</td>
<td>Principles of Marketing</td>
<td></td>
</tr>
<tr>
<td>MOT 4023</td>
<td>Essentials of Technology Management</td>
<td></td>
</tr>
<tr>
<td>MOT 4143</td>
<td>Introduction to Project Management</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 15

To declare a Minor in Technology Management for Nonbusiness Majors, obtain advice, or seek approval of course substitutions for course requirements, students must consult with their academic advisor.

## B. Elective course

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 3013</td>
<td>Introduction to Organization Theory, Behavior, and Management</td>
<td></td>
</tr>
<tr>
<td>MOT 4203</td>
<td>Strategic Management of Technology and Innovation</td>
<td></td>
</tr>
<tr>
<td>MOT 4313</td>
<td>Disruptive Innovations</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 3
To declare a Minor in Technology Management, obtain advice, and seek approval of course substitutions for course requirements, students must consult with their academic advisor.

Certificate in Pathogenic Outbreak Investigations

This interdisciplinary certificate program is designed for students in biology, information systems and cyber security, computer science and computer engineering disciplines to investigate biological and digital pathogen identification, propagation prediction, and mitigation. The required capstone project reinforces the cross-disciplinary learning fostered by the program and provides real-world practice.

This certificate is open only to biology, information systems and cyber security, computer science and computer engineering majors. To apply for the Pathogenic Outbreak Investigations certificate, students should consult with the Director of the Office of Undergraduate Research for specific information about certificate requirements and consult with the Certificate Program Advisor to verify that they have met all University requirements. All courses used to satisfy the requirements of this undergraduate certificate program must be college-level courses taken at UTSA. Students must fulfill all prerequisite requirements for elective courses.

Students pursuing the Certificate in Pathogenic Outbreak Investigations must complete a minimum of 15 semester credit hours:

A. Courses required by all majors:

<table>
<thead>
<tr>
<th>Topic: Introduction to Pathogenic Outbreak Investigations:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 4953 Special Studies in Biology or IS 3313 Introduction to Pathogenic Outbreak Investigations</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic: Advanced Research in Pathogenic Outbreak Investigations:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 4953 Special Studies in Biology or CS 4913 Independent Study or IS 4953 Special Studies in Information Systems</td>
<td></td>
</tr>
</tbody>
</table>

B. Required course according to major:

<table>
<thead>
<tr>
<th>BIO 3713 Microbiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 4533 Malware Analysis</td>
</tr>
<tr>
<td>CS 4593 Topics in Computer Science (Cloud Computing)</td>
</tr>
</tbody>
</table>

C. Elective courses for each major. Select 6 hours from one of the following groups depending on major:

**Biology elective options**

<table>
<thead>
<tr>
<th>BIO 3513 Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 3743 Bacteriology</td>
</tr>
<tr>
<td>BIO 4743 Immunology</td>
</tr>
<tr>
<td>BIO 5762 Fundamentals of Immunology for Biotechnology</td>
</tr>
<tr>
<td>BIO 6973 Special Problems (Comparative Genomics)</td>
</tr>
<tr>
<td>BIO 6973 Special Problems (Microbial Genomics)</td>
</tr>
</tbody>
</table>

**Information Systems/Cyber Security elective options**

<table>
<thead>
<tr>
<th>IS 3523 Intrusion Detection and Incident Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 4463 Web Application Security</td>
</tr>
<tr>
<td>IS 4483 Digital Forensic Analysis I</td>
</tr>
<tr>
<td>IS 4513 Industrial Control Systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IS 4523 Digital Forensic Analysis II</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Computer Science elective options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3113 Principles of Cyber Security</td>
</tr>
<tr>
<td>CS 3433 Computer and Information Security</td>
</tr>
<tr>
<td>CS 3753 Data Science</td>
</tr>
<tr>
<td>CS 3873 Computer Networks</td>
</tr>
<tr>
<td>CS 4223 Bioinformatics and Big Data</td>
</tr>
<tr>
<td>CS 4353 Unix and Network Security</td>
</tr>
<tr>
<td>CS 4363 Cryptography</td>
</tr>
<tr>
<td>CS 4373 Data Mining</td>
</tr>
<tr>
<td>CS 4593 Topics in Computer Science</td>
</tr>
<tr>
<td>CS 4633 Simulation Techniques</td>
</tr>
<tr>
<td>CS 4643 Cellular and Mobile Technologies</td>
</tr>
<tr>
<td>CS 4653 Software and Malware Reverse Engineering</td>
</tr>
<tr>
<td>CS 4663 Distributed and Cloud Systems Security</td>
</tr>
<tr>
<td>CS 4673 Cyber Operations</td>
</tr>
<tr>
<td>CS 4683 Secure Software Development and Analysis</td>
</tr>
<tr>
<td>CS 4713 Compiler Construction</td>
</tr>
<tr>
<td>CS 4823 Parallel Programming</td>
</tr>
<tr>
<td>CS 4833 Embedded Systems</td>
</tr>
<tr>
<td>CS 4843 Cloud Computing</td>
</tr>
<tr>
<td>CS 4853 Advanced Systems Programming</td>
</tr>
<tr>
<td>CS 4863 Distributed Computing and Systems</td>
</tr>
<tr>
<td>CS 4933 Internship in Computer Science</td>
</tr>
<tr>
<td>CS 4963 Advanced Topics in Systems and Cloud</td>
</tr>
<tr>
<td>CS 4973 Advanced Topics in Data Science</td>
</tr>
</tbody>
</table>

To declare a Minor in Technology Management, obtain advice, and seek approval of course substitutions for course requirements, students must consult with their academic advisor.

Information Systems (IS) Courses

**IS 1003. Unlocking Cyber. (3-0) 3 Credit Hours.**

Cybersecurity is a relevant topic for everyone today, personally and professionally. This three-hour course covers core security terminology and concepts and discusses current challenges and threats faced by individuals, organizations, and nations through current topics, case studies, and hands-on labs, and career profiles. We introduce a few tools of the trade to familiarize students with the problem-solving techniques and analytical skills needed for cybersecurity and related degree programs, and with the aim of increasing awareness of the field and its critical importance to our world. Course Fees: BISP $10; BTSI $15; LRBI $15.

**IS 1403. Business Information Systems Fluency. (3-0) 3 Credit Hours. (TCCN = BCIS 1305)**

This course concentrates on a set of core computing skills that are essential to student success, such as using e-mail, word processing, spreadsheets, basic data management, presentation software and on- and off-campus internet resources. Microsoft Office is required to complete the projects assigned in the course. This is an online course. All coursework (lessons, exams, and projects) is completed online. Course Fees: BISP $10; BTSI $15; DL01 $75; LRBI $15.
IS 1413. Excel for Business Information Systems. (3-0) 3 Credit Hours.
This course concentrates on the use of Microsoft Office Excel as a tool for organizing, presenting, and analyzing data. This is an online course. All coursework (lessons, exams, and projects) is completed online. Microsoft Excel is required to complete the projects assigned in the course. Successful completion of this course will help prepare the student for taking the Microsoft Office Specialist (MOS): Microsoft Office Excel Core exam. Students who are MOS certified or have taken an equivalent course that specifically prepares students for the MOS Excel exam can petition for exemption for the course. Students in quantitative majors (such as Accounting, Actuarial Science, Economics, Finance, Management Science, and Statistics and Data Science) are strongly encouraged to take this course in lieu of IS 1403. Course Fees: BISP $10; BTSI $15; DL01 $75; LRB1 $15.

IS 2053. Programming Languages I with Scripting. (3-0) 3 Credit Hours.
Prerequisites: IS 1003 with a grade of "C-" or better. This course introduces programming logic and constructs in Python and basic command line scripting in Linux and Windows environments. Control structures, arithmetic and logical operators, functions, arrays, regular expressions, classes/objects, and exception handling are covered in Python. Students will also write Bash and PowerShell scripts to execute basic processes and tasks. The emphasis will be on building problem solving and coding skills that apply to any language. Course Fees: BISP $10; BTSI $15; LRB1 $15.

IS 2063. Programming Languages II with Java. (3-0) 3 Credit Hours.
Prerequisites: IS 2053 with a grade of "C-" or better. The course focuses on high-level programming constructs through the Java programming language. Students will apply an object-oriented framework to business and security problems using data structures, built-in libraries, file processing, and exception handling, and become familiar with concepts such as inheritance, polymorphism, and generics. Course Fees: BISP $10; BTSI $15; LRB1 $15.

IS 3003. Principles of Information Systems for Management. (3-0) 3 Credit Hours.
An overview of fundamental MIS concepts within a framework for describing and analyzing managerial/organizational information needs. Includes coverage of hardware and software tools, information structures, various types of information systems, and formal problem-solving techniques. Issues related to organizational controls, security, and globalization, collaboration, and ethics as a result of changing technologies are discussed. A variety of assessment methods will be assigned to illustrate the use of specific tools and techniques for problem solving. Differential Tuition: $126. Course Fee: DL01 $75.

IS 3033. Operating Systems Security. (3-0) 3 Credit Hours.
Prerequisites: IS 2053 (IS 2031 and IS 2033 in previous catalogs). IS 3033 is a hands-on course with an emphasis on studying real-world cyber security challenges of Operating System (OS). Throughout the course, students will be introduced to the fundamental knowledge of OS such as process scheduling, memory management, I/O device and file systems etc. as well as hands-on approaches to securing and hardening the essential components of a specified OS (Unix-like or Windows). The lab exercises of this course provide students with comprehensive practices on secure operation and maintenance, secure server configuration, system-level firewalls, kernel security module, logging, and anti-malware measures, etc. Differential Tuition: $126. Course Fee: DL01 $75.

IS 3043. Secure Mobile App Development. (3-0) 3 Credit Hours.
Prerequisites: IS 2063 (IS 2041 and IS 2043 in previous catalogs), or the instructor’s consent. As mobile devices such as smartphones and tablets become ubiquitous, the demand for mobile apps and developers who specialize in mobile technology also surges. This course teaches students how to develop a mobile app in an advanced development environment (e.g., Android Studio) and principles of secure software engineering. The course will cover requirements analysis, interface design, functionality development, testing vulnerabilities, data security and other secure software design strategies with a focus on the usability of mobile apps in the real world. This course can be an elective for the information systems major and cyber security major and minor. Differential Tuition: $126.

IS 3053. Application Development. (3-0) 3 Credit Hours.
Prerequisites: IS 2053 (IS 2031 and IS 2033 in previous catalogs). This course examines the use of developing applications and similar information systems techniques to solve managerial problems. Includes cases where students are asked to design and implement applications that address various classes of analytic problems. Differential Tuition: $126.

IS 3313. Introduction to Pathogenic Outbreak Investigations. (3-0) 3 Credit Hours.
This is a cross-disciplinary introduction to genetic and digital pathogens, their characteristics and methods for rapid analysis, geared toward predicting behavior during real-time outbreak investigations. The course examines both similarities and differences between biological and digital pathogens and presents core concepts from each domain to build a cohesive base for future multi-disciplinary research. Differential Tuition: $126.

IS 3413. Introduction to Telecommunications for Business. (3-0) 3 Credit Hours.
Includes an in-depth look at basic telecommunications terminology and concepts. Introduction to voice and data networks, signaling and multiplexing. Network topologies and protocol fundamentals and architectures are presented and compared. Ethernet, IEEE 802.11x, TCP/IP dedicated circuit, and VPN technologies are introduced. Network security fundamentals are explored. Differential Tuition: $126. Course Fee: DL01 $75.

IS 3423. Network Security. (3-0) 3 Credit Hours.
Prerequisite: IS 3413 with a grade of "C-" or better or consent of instructor and Department Chair. The course provides a foundation in networking technologies that are core to creating secure networks. Topics included in this course are basic cryptography, secure networking protocols, logical and physical security management and security devices. Relation between these technologies and operational and implementation issues for these technologies will also be discussed. (Formerly titled "Secure Network Design"). Differential Tuition: $126. Course Fee: DL01 $75.
IS 3433. Introduction to Digital Forensics. (3-0) 3 Credit Hours.
The digital forensic investigation process involves organizational preparation, incident response, data collection, data analysis, and communication of findings. This course will teach students how to prepare for incidents, how to respond to incidents, and how to reliably collect digital data. Students will be introduced to various types of storage media and sources of volatile data. Students will also be introduced to forensic accounting principles and practices as well as fundamental legal issues related to digital forensics. Differential Tuition: $126.

IS 3453. Networking Fundamentals. (3-0) 3 Credit Hours.
Prerequisite: IS 3413 with a grade of "C-" or better or consent of instructor. This course will focus on the principles of telecommunication with particular emphasis on networking. Networking and transmission protocols will be emphasized. Both IPv4 and IPv6 will be included. This class will also include the hardware side of the network. The role of servers, switches, and routers will be included. Security will be introduced. Differential Tuition: $126.

IS 3513. Information Assurance and Security. (3-0) 3 Credit Hours.
Prerequisite: IS 3413 with a grade of "C-" or better or consent of instructor. This course will provide the student the opportunity to learn about the basic elements that comprise Information Assurance Security. An in-depth presentation of information assurance topics such as fraud, eavesdropping, traffic analysis, intrusion detection and prevention, hacking, viruses, cryptography, risk management, and secure architectures will be discussed. (Formerly IS 4453. Credit cannot be earned for both IS 3513 and IS 4453.) Differential Tuition: $126. Course Fee: DL01 $75.

IS 3523. Intrusion Detection and Incident Response. (3-0) 3 Credit Hours.
Prerequisite: IS 3513 with a grade of "C-" or better or consent of instructor. This course will provide the student with the opportunity to learn about the elements that comprise intrusion detection and incident response. It provides an in-depth look at intrusion detection methodologies, tools, and approaches to handling intrusions when they occur. It examines the laws that address cyber crime and intellectual property issues, and includes a study of proper computer and network forensics procedures to aid in the identification and tracking of intruders and in the potential prosecution of criminal activity. Differential Tuition: $126. Course Fee: DL01 $75.

IS 3533. Cyber Law and Legal System. (3-0) 3 Credit Hours.
An introductory course in laws and legal issues that affect law enforcement, businesses, and investigators related to the preservation, collection, and analysis of digital data. Students will examine computer crime laws, civil and criminal laws that often involve electronic evidence, search and seizure of electronic evidence, judicial issues involving the admissibility of electronic evidence and related testimony, and legal issues involved with electronic surveillance. Differential Tuition: $126.

IS 3833. Cyber Operations. (3-0) 3 Credit Hours.
Prerequisites: IS 3523 with a grade of "C-" or better. This course includes discussions concerning both the defensive and offensive cyber security operations. Protecting the network and the critical infrastructure will be one of the primary emphases of the course. Offensive capabilities will also be discussed. Current events, reverse malware engineering, new technologies, policies and legal subjects will also be part of this course. Differential Tuition: $126.

IS 4023. Applied Big Data with Machine Learning. (3-0) 3 Credit Hours.
Prerequisite: IS 3073. This course provides an overview of machine learning techniques to explore, analyze, and leverage data. Students will be introduced to tools and algorithms they can use to create machine learning models that learn from data, and to scale those models up to big data problems. This course will help prepare students for more advanced courses in cyber analysis and data-driven decision making. Differential Tuition: $126.

IS 4033. Network Operations. (3-0) 3 Credit Hours.
Prerequisite: IS 3453 with a grade of "C-" or better or consent of instructor. The course will explore the fundamentals of operating a network. Issues to be included are physical security, electrical and air conditioning issues, data storage and retention, and backup and redundancy of data. Other topics include floor loading, patch management, converting user requirements to system requirements and disaster recovery. Differential Tuition: $126.

IS 4053. Systems Analysis and Design. (3-0) 3 Credit Hours.
Prerequisite: IS 3063 with a grade of "C-" or better. An introduction to systems theory and development techniques. Topics include problem definition, system development life cycle, feasibility analyses, project management, system models and CASE tools. Differential Tuition: $126.

IS 4063. Advanced Topics in Information Systems. (3-0) 3 Credit Hours.
Prerequisite: 15 semester credit hours of information systems courses (excluding IS 1403 and IS 3003). Survey of recent developments in information technology. Analysis will focus on applications in the business community and theoretical developments that relate to those applications. Ordinarily taken during semester of graduation. Differential Tuition: $126.

IS 4083. Agile Project Management. (3-0) 3 Credit Hours.
This introductory course presents concepts and techniques for leading agile teams in many types of projects including software development, engineering, construction, product development, as well as science and technology focused efforts. The course will give students the opportunity to develop an agile mindset and a range of adaptive skills including agile methods, practices and values that are associated with achieving higher levels of performance and customer satisfaction. The course will also prepare the student to sit for the Project Management Institute's PMI-ACP certification exam. Differential Tuition: $126.

IS 4143. Wide Area Networks. (3-0) 3 Credit Hours.
Prerequisite: IS 3413 with a grade of "C-" or better or consent of instructor. This course explores telecommunication technologies associated with wide area networks. Technologies such as frame relay, MPLS, SD-WAN and VPN tunneling will be studied. The role of common carriers, leased lines and associated security and quality of service issues will also be discussed. Differential Tuition: $126.

IS 4183. Advanced Database Concepts and Applications. (3-0) 3 Credit Hours.
Prerequisite: IS 3063 with a grade of "C-" or better. Databases play a critical role in the business operations of most organizations. This course provides an in-depth coverage on concepts governing the design and management of database systems. Topics include data modeling, database design, administration, optimization and performance evaluation, SQL language, procedures, functions and triggers. Students will have the opportunity to learn how to design and build modern database systems through a set of hands-on exercises and projects using MS SQL Server, Oracle and other contemporary database software. The course also covers some advanced topics such as database security, database connectivity and Web applications. Differential Tuition: $126.
IS 4213. Data Center Infrastructure Planning. (3-0) 3 Credit Hours.
Prerequisite: IS 4033 with a grade of "C-" or better or consent of instructor. The purpose of this class will be to explore the electrical power, air conditioning, and fire suppressant requirements of a data center. Electrical grids, standby generators, and uninterruptible power supplies will be discussed. The course explores the various aspects of power quality, interruption of service, voltage flicker and control, voltage swells and sags, and power surges. Air conditioning requirements and methods will also be included. Fire suppressant techniques will also be part of the class. A comprehensive project involving the design of the data center to include these three major issues will be part of the class. Differential Tuition: $126.

IS 4223. Emerging Network Technologies. (3-0) 3 Credit Hours.
Cloud computing has become popular in industry. This class will look at what it is and how it works. Security issues will be an important part of the course. Other topics include virtual machines, storage area networks, software-defined networks, and remote systems management. New hardware will also be included. Differential Tuition: $126.

IS 4233. Introduction to Cloud Computing. (3-0) 3 Credit Hours.
Prerequisite: IS 2053 with a grade of "C-" or better or consent of instructor. Cloud computing has gone from a leading trend in IT to a widely adopted mainstream computing platform. This course introduces cloud computing concepts where students explore the basics of cloud services ecosystem and deployment models. Students will become acquainted with commonly used industry terms, typical business scenarios and applications for the cloud, security models, and benefits and limitations inherent in the new paradigm of computing. This course will help prepare students for more advanced courses in big data technology and cyber analysis. (Formerly titled Cloud Technologies for Business.) Differential Tuition: $126.

IS 4463. Web Application Security. (3-0) 3 Credit Hours.
Prerequisite: IS 3513 with a grade of "C-" or better or consent of instructor. The security issues related to web applications will be discussed in this course. Topics include web application authentication, authorization, as well as browser and web database security principles. Various web application security attack types such as code injection, cross-site scripting, and cross-site request forgery will be studied. The course will also include discussions about business aspects that contribute to a secure web-based transaction environment. (Formerly titled Secure Electronic Commerce.) Differential Tuition: $126. Course Fee: DL01 $75.

IS 4473. Information Assurance Policy. (3-0) 3 Credit Hours.
Prerequisites: IS 3413 with a grade of "C-" or better and one 3-semester-credit-hour security course or consent of instructor. There are many policy issues, within the firm and at various levels of government, that affect information assurance. This course will examine how these policies affect computer security. Subjects will include privacy of information, intellectual property protection, globalization of information systems, and other policy matters. The protection and control of secured information will also be discussed. Differential Tuition: $126. Course Fee: DL01 $75.

IS 4483. Digital Forensic Analysis I. (3-0) 3 Credit Hours.
An introductory course in collecting, examining, and preserving evidence of crimes involving digital devices. This course examines the issues, tools, and control techniques needed to successfully investigate illegal activities facilitated through the use of information technology. The tools of collecting, examining, and evaluating data in an effort to establish intent, culpability, motive, means, methods, and loss resulting from such crimes will be examined. Differential Tuition: $126. Course Fee: DL01 $75.

IS 4513. Industrial Control Systems. (3-0) 3 Credit Hours.
Prerequisite: IS 3513 with a grade of "C-" or better, or consent of instructor and Department Chair. Many of the critical infrastructure systems contain a system control and data acquisition (SCADA) component. Frequently, the control systems are remotely accessed and therefore become the focal point for attack. This course examines the control system components from the standpoint of vulnerability and protection. (Formerly titled Cyber and Physical Systems.) Differential Tuition: $126.

IS 4523. Digital Forensic Analysis II. (3-0) 3 Credit Hours.
Prerequisite: IS 4483. This course examines advanced digital forensic analysis topics, techniques, and control mechanisms. Advanced topics include operating system artifacts, non-standard file systems, mobile devices, malware, and volatile memory. Students will gain experience with state-of-the-art forensic tools and techniques needed to successfully investigate illegal activities perpetuated through the use of information technology. Differential Tuition: $126. Course Fee: DL01 $75.

IS 4533. Malware Analysis. (3-0) 3 Credit Hours.
Prerequisites: IS 3033 and IS 3513 with grades of "C-" or better, or instructor's consent. This class is designed to introduce students to concepts, tools and techniques associated with modern malicious code analysis. The course will examine the methods employed by malicious actors to prevent analysis and neutralization of their exploits and discuss ways of leveraging resources and tools to effectively examine malicious code. Safe handling practices for malware analysis such as sandboxing, virtualization, and system isolation will be taught/practiced throughout the course. Differential Tuition: $126.

IS 4543. Cyber Attack and Defend. (3-0) 3 Credit Hours.
This course will bridge the concepts of implementing a secure network with actual cyber threats. Students will learn the necessary skills to implement key IT system components, create security policies, and understand the background of what hackers do to mandate such security measures. Students will conduct red team assessments against common infrastructure components, and monitor residual effects of attacks. Differential Tuition: $126.

IS 4913. Industrial Control Systems. (3-0) 3 Credit Hours.
Prerequisite: IS 3513 with a grade of "C-" or better, or consent of instructor and Department Chair. Many of the critical infrastructure systems contain a system control and data acquisition (SCADA) component. Frequently, the control systems are remotely accessed and therefore become the focal point for attack. This course examines the control system components from the standpoint of vulnerability and protection. (Formerly titled Cyber and Physical Systems.) Differential Tuition: $126.
Management of Technology (MOT) Courses

MOT 4023. Essentials of Technology Management. (3-0) 3 Credit Hours.
This survey course provides an overview of the issues that impact technology management. All technology management subsystems are included: strategy, technology, resource, organizational, project, and people. The course is designed to help students develop the systems thinking necessary to successfully interact with the burgeoning technological world. The course will also provide the opportunity for students to develop the entrepreneurial skills important in managing the design, development, and commercialization of technological goods and services. (Formerly titled "Management of Technology"). Differential Tuition: $126.

MOT 4143. Introduction to Project Management. (3-0) 3 Credit Hours.
This introductory course presents concepts and techniques for the management of many types of projects including engineering, construction, product development, as well as science and technology projects. The course is designed to help students develop project planning skills including scope definition, scheduling, cost-estimating and risk assessment. The course will also provide the opportunity for students to develop skills in support of project leadership, team building and communication. Differential Tuition: $126.

MOT 4153. Project Management Certification. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. This course is designed to give students the opportunity to prepare for the Project Management Professional (PMP) and Certified Associate in Project Management (CAPM) certification exams. The course is structured around the Project Management Institute Knowledge Areas including: integration, scope, time, cost, quality, risk, procurement, human resources, communication, and stakeholders. The course focuses on the inputs, tools, techniques and outputs associated with the core project management processes. Students will also complete diagnostics exam instruments and practice exams. Differential Tuition: $126.

MOT 4203. Strategic Management of Technology and Innovation. (3-0) 3 Credit Hours.
This course examines the issues involved in the strategic management of technology in contemporary business organizations. The course will examine new product development, emerging technologies and product portfolios; and will explore the dynamics of innovation in the firm. Differential Tuition: $126.

MOT 4313. Disruptive Innovations. (3-0) 3 Credit Hours.
This survey course focuses on technologies that may transform society and improve quality of life: the emphasis is on the nexus among biotechnology, information systems, materials, and renewable energy. The course will help students refine the systems thinking necessary to connect technology with users: it investigates the barriers that entrepreneurs face during commercialization. Cooperative learning is a defining characteristic of the course. Differential Tuition: $126.

MOT 4911. Independent Study. (0-0) 1 Credit Hour.
Prerequisite: Approval in writing from the instructor, the Department Chair, and the Dean of the College of Business. See academic advisor for the required forms. Independent research in a management of technology topic under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor’s degree. Differential Tuition: $42.

MOT 4912. Independent Study. (0-0) 2 Credit Hours.
Prerequisite: Approval in writing from the instructor, the Department Chair, and the Dean of the College of Business. See academic advisor for the required forms. Independent research in a management of technology topic under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor’s degree. Differential Tuition: $84.

MOT 4913. Independent Study. (0-0) 3 Credit Hours.
Prerequisite: Approval in writing from the instructor, the Department Chair, and the Dean of the College of Business. See academic advisor for the required forms. Independent research in a management of technology topic under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor’s degree. Differential Tuition: $126.

MOT 4951. Special Studies in Management of Technology. (1-0) 1 Credit Hour.
An organized course offering specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor’s degree. Differential Tuition: $42.
MOT 4952. Special Studies in Management of Technology. (2-0) 2 Credit Hours.
An organized course offering specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Differential Tuition: $84.

MOT 4953. Special Studies in Management of Technology. (3-0) 3 Credit Hours.
An organized course offering specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Differential Tuition: $126.