Computing and Information Sciences

The B.S. in Computing and Information Sciences is composed of four specializations: Computer Information Systems, Computer Science, Cybersecurity, and Software Engineering. See each specialization for a detailed description.

Program Requirements

In addition to the university’s general requirements, students seeking the B.S. in Computing and Information Sciences must meet the requirements listed below.

A minimum grade of “C-” is required for all major and major-related courses with a cumulative major GPA of 2.5 or higher. Students should consult with their academic advisor for courses which may satisfy both the General Studies requirements and common prerequisites.

Computer Information Systems Specialization

The Computer Information Systems (CIS) specialization integrates the foundation of information systems principles with concepts in modern programming languages, database systems, software engineering principles, and net-centric applications. The focus of this specialization is on problem solving in applications development.

General Studies

In addition to the General Education requirements listed on this page, students must satisfy all additional University requirements, including the Gordon Rule, multicultural, and foreign language requirements. With appropriate planning and coordination with an academic advisor, students may satisfy some of the general University requirements through the General Education curriculum. For a complete listing of general degree requirements, refer to the "Graduation and General Degree Requirements (http://catalog.uwf.edu/undergraduate/universityrequirements)" section of this catalog.

General Studies Curriculum:

Communication

ENC 1101 English Composition I 3
ENC 1102 English Composition II 3

Mathematics

Choose one course from Group A and one additional course from either Group A or Group B 6

Group A

MAC 1105 College Algebra
MAC 2311 Analytic Geometry and Calculus I
MGF 1106 Mathematics for Liberal Arts I
MGF 1107 Mathematics for Liberal Arts II
STA 2023 Elements of Statistics

Group B

MAC 1105C College Algebra with Lab
MAC 1114 Trigonometry
MAC 1140 Precalculus Algebra
MAC 2233 Calculus with Business Applications

MAC 2312 Analytic Geometry and Calculus II

Social Sciences

Choose one course from Group A and one additional course from either Group A or Group B 6

Group A

AMH 2020 United States since 1877
ANT 2000 Introduction to Anthropology
ECO 2013 Principles of Economics Macro
POS 2041 American Politics
PSY 2012 General Psychology
SPM 2010 Sport in Global Society
SYG 2000 Introduction to Sociology

Group B

AMH 2010 United States to 1877
ANT 2400 Current Cultural Issues
ANT 2100 Introduction to Archaeology
CCJ 2002 Survey of Crime and Justice
CPO 2002 Comparative Politics
DEP 2004 Human Development Across the Lifespan
EUH 1000 Western Perspectives I
EUH 1001 Western Perspectives II
FIN 2104 Personal Financial Planning
GEA 2000 Nations and Regions of the World
GEB 1011 Introduction to Business
IDH 1041 Honors Core 2
INR 2002 International Politics
MMC 2000 Principles of Mass Communication
PLA 2013 Survey of American Law
SOW 2192 Understanding Relationships in the 21st Century
SYG 2010 Current Social Problems

Humanities

Choose one course from Group A and one additional course from either Group A or Group B 6

Group A

ARH 1000 Art Appreciation
LIT 2000 Introduction to Literature
MUL 2010 Music Appreciation
PHI 2010 Introduction to Philosophy
THE 2000 Theatre Appreciation

Group B

AML 2010 American Literature I
AML 2020 American Literature II
AML 2072 Sex, Money, and Power in American Literature
ARH 2050 Western Survey I: Prehistory to the Medieval Period
ARH 2051 Western Survey II: Renaissance to Contemporary
ART 1015C Exploring Artistic Vision
ART 2821 Art and Visual Culture Today
CRW 2001 Introduction to Creative Writing
ENL 2010  History of English Literature I
ENL 2020  History of English Literature II
IDH 1040  Honors Core 1
MUH 2930  The Music Experience: Special Topics
PHI 2103  Critical Thinking
PHI 2603  Ethics in Contemporary Society
REL 1300  World Religions
THE 2300  Survey of Dramatic Literature
SPC 2608  Basic Communication Skills

Natural Sciences
Choose one course from Group A and one additional course from either Group A or Group B

Group A
AST 1002  Descriptive Astronomy
BSC 1005  General Biology for Non-Majors
BSC 1085  Anatomy and Physiology I
BSC 2010  Biology I
CHM 1020  Concepts in Chemistry
CHM 2045  General Chemistry I
ESC 2000  Introduction to Earth Science
EVR 2001  Introduction to Environmental Science
PHY 1020  Introduction to Concepts in Physics
PHY 2048  University Physics I
PHY 2048C  University Physics I - Studio
PHY 2053  General Physics I

Group B
ANT 2511  Biological Anthropology
BOT 2010  General Botany
BSC 1050  Fundamentals of Ecology
BSC 1086  Anatomy and Physiology II
BSC 2011  Biology II
BSC 2311  Introduction to Oceanography and Marine Biology
CGS 2060  Excursions in Computing
CHM 1032  Fundamentals of General Chemistry
CHM 2046  General Chemistry II
CIS 2530  Introduction to Cyber Security
GEO 1200  Physical Geography
GLY 2010  Physical Geology
MCB 1000  Fundamentals of Microbiology
PHY 2049  University Physics II
PHY 2054  General Physics II

* May be taken with or without lab.
** General Physics is non-calculus based and is usually recommended for non-science majors. University Physics is calculus based and is usually recommended for science majors.
*** Although students receive 5 semester hours credit for PHY 2048C, an additional 3 semester science course will be needed to meet General Education requirements.

General Education Electives
Choose an additional course from two of the three areas of Humanities, Social Sciences and Natural Sciences

The following courses are recommended to complete general studies requirements:

- Lecture Science
  - CGS 2060  Excursions in Computing  3
  - Humanities/Contemporary Values
  - PHI 2603  Ethics in Contemporary Society  3
  - Mathematics
  - STA 2023  Elements of Statistics  3
  - MAC 2233  Calculus with Business Applications  3
  - Social Science: Socio-political
  - ECO 2013  Principles of Economics Macro  3

Common Prerequisites
State mandated common prerequisites must be completed prior to graduation, but are not required for admission to the program. See the Common Prerequisite Manual (https://dlss.flvc.org/admin-tools/common-prerequisites-manuals) for course substitutions from Florida colleges and universities.

- ACG 2021  Principles of Financial Accounting  3
- ACG 2071  Principles of Managerial Accounting  3
- CGS 2570  Personal Computer Applications  3
- COP 2253  Programming Using Java  3
- COP 2334  Programming Using C++  3
- ECO 2013  Principles of Economics Macro  3
- ECO 2023  Principles of Economics Micro  3
- MAC 2233  Calculus with Business Applications  3
- STA 2023  Elements of Statistics  3

Total Hours 27

* Indicates common prerequisites which can be used to satisfy General Studies requirements.
† A minimum grade of C- is required for COP 2253, COP 2334, MAC 2233 and STA 2023.

Lower Division Electives
Students must complete sufficient 1000/2000 level electives to satisfy at least 60 sh in the lower division. Current UWF students may use elective courses at any level (1000-4000) to meet this elective requirement.

Total Hours 0-6

Major
- CEN 3031  Software Engineering I  3
- CEN 3032  Software Engineering II  3
- CEN 4400  Introduction to Operations Research  3
- CEN 4721  Human-Computer Interaction  3
- CIS 3512  Software Documentation  3
- CIS 4595C  Capstone Systems Project  3
- CNT 4007  Theory and Fundamentals of Networks  3
- COP 3022  Intermediate Computer Programming  3
- COP 3813  Server-Side Programming  3
- COP 4027  Advanced Computer Programming  3
- COP 4610  Theory and Fundamentals of Operating Systems  3
- COP 4710  Database Systems  3
COP 4856  Distributed Software Architecture I  3
COT 3100  Discrete Structures  3
CAP 4770  Data Mining  3
COP 4723  Database Administration  3

Total Hours 48

Major-Related
Four 3000/4000 level advisor approved electives  12

Total Hours 12

+ Courses included in the major GPA

Computer Science Specialization
The Computer Science (CS) specialization emphasizes analytical thinking and problem solving using scientific applications. The degree includes the theoretical foundations of computer science in the study of algorithms, data structures, computer architecture, programming languages, and net-centric computing.

General Studies
In addition to the General Education requirements listed on this page, students must satisfy all additional University requirements, including the Gordon Rule, multicultural, and foreign language requirements. With appropriate planning and coordination with an academic advisor, students may satisfy some of the general University requirements through the General Education curriculum. For a complete listing of general degree requirements, refer to the “Graduation and General Degree Requirements (http://catalog.uwf.edu/undergraduate/universityrequirements)” section of this catalog.

General Studies Curriculum:

Communication
ENC 1101  English Composition I  3
ENC 1102  English Composition II  3

Mathematics
Choose one course from Group A and one Additional course from either Group A or Group B

Group A
MAC 1105  College Algebra
MAC 2311  Analytic Geometry and Calculus I
MGF 1106  Mathematics for Liberal Arts I
MGF 1107  Mathematics for Liberal Arts II
STA 2023  Elements of Statistics

Group B
MAC 1105C  College Algebra with Lab
MAC 1114  Trigonometry
MAC 1140  Precalculus Algebra
MAC 2233  Calculus with Business Applications
MAC 2312  Analytic Geometry and Calculus II

Social Sciences
Choose one course from Group A and one additional course from either Group A or Group B

Group A
AMH 2020  United States since 1877
ANT 2000  Introduction to Anthropology

ECO 2013  Principles of Economics Macro
POS 2041  American Politics
PSY 2012  General Psychology
SPM 2010  Sport in Global Society
SYG 2000  Introduction to Sociology

Group B
AMH 2010  United States to 1877
ANT 2400  Current Cultural Issues
ANT 2100  Introduction to Archaeology
CCJ 2002  Survey of Crime and Justice
CPO 2002  Comparative Politics
DEP 2004  Human Development Across the Lifespan
EUH 1000  Western Perspectives I
EUH 1001  Western Perspectives II
FIN 2104  Personal Financial Planning
GEA 2000  Nations and Regions of the World
GEB 1011  Introduction to Business
IDH 1041  Honors Core 2
INR 2002  International Politics
MMC 2000  Principles of Mass Communication
PLA 2013  Survey of American Law
SOW 2192  Understanding Relationships in the 21st Century
SYG 2010  Current Social Problems

Humanities
Choose one course from Group A and one additional course from either Group A or Group B

Group A
ARH 1000  Art Appreciation
LIT 2000  Introduction to Literature
MUL 2010  Music Appreciation
PHI 2000  Introduction to Philosophy
THE 2000  Theatre Appreciation

Group B
AML 2010  American Literature I
AML 2020  American Literature II
AML 2072  Sex, Money, and Power in American Literature
ARH 2050  Western Survey I: Prehistory to the Medieval Period
ARH 2051  Western Survey II: Prehistory to the Medieval Period
ART 1015C  Exploring Artistic Vision
ART 2821  Art and Visual Culture Today
CRW 2001  Introduction to Creative Writing
ENL 2010  History of English Literature I
ENL 2020  History of English Literature II
IDH 1040  Honors Core 1
MUH 2930  The Music Experience: Special Topics
PHI 2103  Critical Thinking
PHI 2603  Ethics in Contemporary Society
REL 1300  World Religions
### Natural Sciences

Choose one course from Group A and one additional course from either Group A or Group B.

**Group A**
- AST 1002 Descriptive Astronomy
- BSC 1005 General Biology for Non-Majors
- BSC 1085 Anatomy and Physiology I
- BSC 2010 Biology I
- CHM 1020 Concepts in Chemistry
- CHM 2045 General Chemistry I
- ESC 2000 Introduction to Earth Science
- EVR 2001 Introduction to Environmental Science
- PHY 1020 Introduction to Concepts in Physics
- PHY 2048 University Physics I
- PHY 2048C University Physics I - Studio
- PHY 2053 General Physics I

**Group B**
- ANT 2511 Biological Anthropology
- BOT 2010 General Botany
- BSC 1050 Fundamentals of Ecology
- BSC 1086 Anatomy and Physiology II
- BSC 2011 Biology II
- BSC 2311 Introduction to Oceanography and Marine Biology
- CGS 2060 Excursions in Computing
- CHM 1032 Fundamentals of General Chemistry
- CHM 2046 General Chemistry II
- CIS 2530 Introduction to Cyber Security
- GEO 1200 Physical Geography
- GLY 2010 Physical Geology
- MCB 1000 Fundamentals of Microbiology
- PHY 2049 University Physics II
- PHY 2054 General Physics II

* May be taken with or without lab.
** General Physics is non-calculus based and is usually recommended for non-science majors. University Physics is calculus based and is usually recommended for science majors.
*** Although students receive 5 semester hours credit for PHY 2048C, an additional 3 semester science course will be needed to meet General Education requirements.

### General Education Electives

Choose an additional course from two of the three areas of Humanities, Social Sciences and Natural Sciences.

The following courses are recommended to complete general studies requirements:

**Humanities/Contemporary Values**
- PHI 2603 Ethics in Contemporary Society

**Mathematics**
- MAC 2311 Analytic Geometry and Calculus I
- MAC 2312 Analytic Geometry and Calculus II

**Natural Science**
- PHY 2048+L University Physics I (+Lab)
- PHY 2049+L University Physics II (+Lab)

**Social Science: Socio-political**
- ECO 2013 Principles of Economics Macro

### Common Prerequisites

State mandated common prerequisites must be completed prior to graduation, but are not required for admission to the program. See the Common Prerequisite Manual (https://dlss.flvc.org/admin-tools/common-prerequisites-manuals) for course substitutions from Florida colleges and universities.

- COP XXXX Introductory programming in Ada, C, C++, Pascal, or equivalent language
- MAC 2311 Analytic Geometry and Calculus I
- MAC 2312 Analytic Geometry and Calculus II
- PHY 2048+L University Physics I (+Lab)
- PHY 2049+L University Physics II (+Lab)

Two science courses for science majors

**Total Hours**
- 25

* Indicates common prerequisites which can be used to satisfy General Studies requirements.

** A minimum grade of C is required for MAC2311, MAC2312 and PHY2048/L.

† A minimum grade of C- is required for COP XXXX

### Lower Division Electives

Students must complete sufficient 1000/2000 level electives to satisfy at least 60 sh in the lower division. Current UWF students may use elective courses at any level (1000-4000) to meet this elective requirement.

**Total Hours**
- 0-12

If not taken as a general studies course, CGS 2060 Excursions in Computing is recommended as a lower-division elective.

### Major

- CDA 3101 Introduction to Computer Organization
- COT 3100 Discrete Structures
- CEN 3031 Software Engineering I
- CIS 4592 Capstone Project
- COP 4710 Database Systems
- COP 3014 Algorithm and Program Design
- COP 3530 Data Structures and Algorithms I
- COP 4020 Programming Languages
- COP 4331 Object Oriented Programming
- COP 4534 Data Structures and Algorithms II
- COP 4634 Systems & Networks I
- COP 4635 Systems & Networks II
- COT 4420 Theory of Computation

List of pre-approved concentration courses available in the department

**Total Hours**
- 51

* Courses included in the major GPA
Major-Related

MAS 3105  Linear Algebra  3
MHF 3202  Set Theory and Mathematical Logic  3
STA 4321  Introduction to Mathematical Statistics I  3
Total Hours  9

* Four courses must be selected from any Computer Science concentration. Students should consult with the CS academic advisor, or their assigned CS faculty advisor, for the courses that satisfy the concentration areas.

Cybersecurity Specialization

The Cybersecurity specialization prepares graduates to be leaders in the protection of data assets and analysis of potential threats to system and networks. The curriculum focuses on the techniques, policies, operational procedures, and technologies that secure and defend the availability, integrity, authentication, confidentiality, and non repudiation of information and information systems, in local as well as more broadly based domains. The major helps prepare students for careers as information systems security professionals, senior system managers, and system administrators responsible for information systems and security of those systems.

General Education

In addition to the General Education requirements listed on this page, students must satisfy all additional University requirements, including the Gordon Rule, multicultural, and foreign language requirements. With appropriate planning and coordination with an academic advisor, students may satisfy some of the general University requirements through the General Education curriculum. For a complete listing of general degree requirements, refer to the "Graduation and General Degree Requirements (http://catalog.uwf.edu/undergraduate/universityrequirements)" section of this catalog.

General Education Curriculum:

Communication

ENC 1101  English Composition I  3
ENC 1102  English Composition II  3

Mathematics

Choose one course from Group A and one Additional course from either Group A or Group B  6

Group A

MAC 1105  College Algebra
MAC 2311  Analytic Geometry and Calculus I
MGF 1106  Mathematics for Liberal Arts I
MGF 1107  Mathematics for Liberal Arts II
STA 2023  Elements of Statistics

Group B

MAC 1105C  College Algebra with Lab
MAC 1114  Trigonometry
MAC 1140  Precalculus Algebra
MAC 2233  Calculus with Business Applications
MAC 2312  Analytic Geometry and Calculus II

Social Sciences

Choose one course from Group A and one additional course from either Group A or Group B  6

Group A

AMH 2020  United States since 1877
ANT 2000  Introduction to Anthropology
ECO 2013  Principles of Economics Macro
POS 2041  American Politics
PSY 2012  General Psychology
SPM 2010  Sport in Global Society
SYG 2000  Introduction to Sociology

Group B

AMH 2010  United States to 1877
ANT 2400  Current Cultural Issues
ANT 2100  Introduction to Archaeology
CCJ 2002  Survey of Crime and Justice
CPO 2002  Comparative Politics
CCJ 2005  Survey of Crime and Justice
EUH 2000  Western Perspectives I
EUH 2001  Western Perspectives II
FIN 2104  Personal Financial Planning
GEO 2000  Nations and Regions of the World
GEB 1011  Introduction to Business
IDH 1041  Honors Core 2
INR 2002  International Politics
MMC 2000  Principles of Mass Communication
PLA 2013  Survey of American Law
SOW 2192  Understanding Relationships in the 21st Century
SYG 2010  Current Social Problems

Humanities

Choose one course from Group A and one additional course from either Group A or Group B  6

Group A

ARH 1000  Art Appreciation
LIT 2000  Introduction to Literature
MUL 2010  Music Appreciation
PHI 2010  Introduction to Philosophy
THE 2000  Theatre Appreciation

Group B

AML 2010  American Literature I
AML 2020  American Literature II
AML 2072  Sex, Money, and Power in American Literature
ARH 2050  Western Survey I: Prehistory to the Medieval Period
ARH 2051  Western Survey II: Renaissance to Contemporary
ART 1015C  Exploring Artistic Vision
ART 2821  Art and Visual Culture Today
CRW 2001  Introduction to Creative Writing
ENL 2010  History of English Literature I
ENL 2020  History of English Literature II
IDH 1040  Honors Core 1
MUH 2930  The Music Experience: Special Topics
**Education Requirements:**

The following courses are recommended to complete general Humanities, Social Sciences and Natural Sciences requirements.

**Choose an additional course from two of the three areas of General Education Electives:**

**Natural Sciences**

Choose one course from Group A and one additional course from either Group A or Group B

**Group A**

- AST 1002 Descriptive Astronomy
- BSC 1050 General Biology for Non-Majors
- BSC 1086 Anatomy and Physiology I
- BSC 2011 Biology II
- BSC 2311 Introduction to Oceanography and Marine Biology
- CGS 2060 Excursions in Computing
- CHM 1032 Fundamentals of General Chemistry
- CHM 2046 General Chemistry II
- CIS 2530 Introduction to Cyber Security
- GEO 1200 Physical Geography
- GLY 2010 Physical Geology
- MCB 1000 Fundamentals of Microbiology
- PHY 2048 University Physics I
- PHY 2048C University Physics I - Studio
- PHY 2053 General Physics I

**Group B**

- ANT 2511 Biological Anthropology
- BOT 2010 General Botany
- BSC 1065 Fundamentals of Ecology
- BSC 1086 Anatomy and Physiology II
- BSC 2011 Biology II
- BSC 2311 Introduction to Oceanography and Marine Biology
- CDA 3101 Introduction to Computer Organization
- CEN 4078 Secure Software Development
- CIS 4368 Introduction to Database Security
- CIS 4385 Ethical Hacking and Penetration Testing
- CIS 4595C Capstone Systems Project
- CNT 4403 Computer and Network Security
- CNT 4416 Cyber War Gaming
- COP 3014 Algorithm and Program Design
- COP 3022 Intermediate Computer Programming
- COP 3530 Data Structures and Algorithms I
- COP 4710 Database Systems
- COP 4723 Database Administration

**Mathematics**

- MAC 2311 Analytic Geometry and Calculus I
- MAC 2312 Analytic Geometry and Calculus II

**Natural Science**

- PHY 2048+L University Physics I (+Lab)
- CIS 2530 Introduction to Cyber Security
- ECO 2023 Principles of Economics Macro

**Common Prerequisites**

State mandated common prerequisites must be completed prior to graduation, but are not required for admission to the program. See the Common Prerequisite Manual for course substitutions from Florida colleges and universities.

**Lower Division Electives**

Students must complete sufficient 1000/2000 level electives to satisfy at least 60 sh in the lower division. Current UWF students may use elective courses at any level (1000-4000) to meet this elective requirement.

If not taken as a general education course, the following courses are recommended as lower division electives:

**Major**

- CDA 3101 Introduction to Computer Organization
- CEN 4078 Secure Software Development
- CIS 4368 Introduction to Database Security
- CIS 4385 Ethical Hacking and Penetration Testing
- CIS 4595C Capstone Systems Project
- CNT 4403 Computer and Network Security
- CNT 4416 Cyber War Gaming
- COP 3014 Algorithm and Program Design
- COP 3022 Intermediate Computer Programming
- COP 3530 Data Structures and Algorithms I
- COP 4710 Database Systems
- COP 4723 Database Administration

**General Education Electives**

Choose an additional course from two of the three areas of Humanities, Social Sciences and Natural Sciences requirements.

The following courses are recommended to complete general education requirements:

**Humanities/Contemporary Values**

- PHI 2003 Ethics in Contemporary Society

**Natural Sciences**

- PHI 2103 Critical Thinking
- PHI 2603 Ethics in Contemporary Society
- REL 1300 World Religions
- THE 2300 Survey of Dramatic Literature
- SPC 2608 Basic Communication Skills

**Group A**

- AST 1002 Descriptive Astronomy
- BSC 1050 General Biology for Non-Majors
- BSC 1086 Anatomy and Physiology I
- BSC 2011 Biology II
- BSC 2311 Introduction to Oceanography and Marine Biology
- CGS 2060 Excursions in Computing
- CHM 1032 Fundamentals of General Chemistry
- CHM 2046 General Chemistry II
- CIS 2530 Introduction to Cyber Security
- GEO 1200 Physical Geography
- GLY 2010 Physical Geology
- MCB 1000 Fundamentals of Microbiology
- PHY 2048 University Physics I
- PHY 2048C University Physics I - Studio
- PHY 2053 General Physics I

**Group B**

- ANT 2511 Biological Anthropology
- BOT 2010 General Botany
- BSC 1050 General Biology for No-Majors
- BSC 1086 Anatomy and Physiology I
- BSC 2011 Biology II
- BSC 2311 Introduction to Oceanography and Marine Biology
- CGS 2060 Excursions in Computing
- CHM 1032 Fundamentals of General Chemistry
- CHM 2046 General Chemistry II
- CIS 2530 Introduction to Cyber Security
- GEO 1200 Physical Geography
- GLY 2010 Physical Geology
- MCB 1000 Fundamentals of Microbiology
- PHY 2049 University Physics II
- PHY 2054 General Physics II

* May be taken with or without lab.

** General Physics is non-calculus based and is usually recommended for non-science majors. University Physics is calculus based and is usually recommended for science majors.

*** Although students receive 5 semester hours credit for PHY 2048C, an additional 3 semester science course will be needed to meet General Education requirements.

**Total Hours**

- Two science course for science majors

**Total Hours**

- 25

* Indicates common prerequisites which can be used to satisfy General Education requirements.

† Minimum grade of C is required for MAC 2311, MAC 2312 and PHY2048/L.

** A minimum grade of C- is required for COP XXXX
Choose one group of courses from the following groupings 6

COP 4610  Theory and Fundamentals of Operating Systems +
CNT 4007  Theory and Fundamentals of Networks (or)

or

COP 4634  Systems & Networks I +
COP 4635  Systems & Networks II +
CTS 4348  Linux System Administration +

Required Courses Not Completed in Common Prerequisites
STA 2023  Elements of Statistics
CIS 2530  Introduction to Cyber Security

Total Hours 48

+  Courses included in the major GPA

**Major-Related**

Four 3000/4000 level advisor approved electives including courses in computer science, electrical and computer engineering, management information systems, criminal justice, applied sciences and industry certification courses. List of approved major-related courses available in the department.

Total Hours 12

**Software Engineering Specialization**

The Software Engineering (SE) specialization incorporates theoretical foundations of computer science with the study of principles and practices regarding the development of high-quality software systems that meet client needs. This track places emphasis on the development of complex, large-scale software systems, software processes, and project management.

**General Education**

In addition to the General Education requirements listed on this page, students must satisfy all additional University requirements, including the Gordon Rule, multicultural, and foreign language requirements. With appropriate planning and coordination with an academic advisor, students may satisfy some of the general University requirements through the General Education curriculum. For a complete listing of general degree requirements, refer to the “Graduation and General Degree Requirements” section of this catalog.

General Education Curriculum:

**Communication**

ENC 1101  English Composition I 3
ENC 1102  English Composition II 3

**Mathematics**

Choose one course from Group A and one Additional course from either Group A or Group B 6

Group A

MAC 1105  College Algebra
MAC 2311  Analytic Geometry and Calculus I
MGF 1106  Mathematics for Liberal Arts I
MGF 1107  Mathematics for Liberal Arts II

STA 2023  Elements of Statistics

Group B

MAC 1105C  College Algebra with Lab
MAC 1114  Trigonometry
MAC 1140  Precalculus Algebra
MAC 2233  Calculus with Business Applications
MAC 2312  Analytic Geometry and Calculus II

**Social Sciences**

Choose one course from Group A and one additional course from either Group A or Group B 6

Group A

AMH 2020  United States since 1877
ANT 2000  Introduction to Anthropology
ECO 2013  Principles of Economics Macro
POS 2041  American Politics
PSY 2012  General Psychology
SPM 2010  Sport in Global Society
SYG 2000  Introduction to Sociology

Group B

AMH 2010  United States to 1877
ANT 2400  Current Cultural Issues
ANT 2100  Introduction to Archaeology
CCJ 2002  Survey of Crime and Justice
CPO 2002  Comparative Politics
DEP 2004  Human Development Across the Lifespan
EUH 1000  Western Perspectives I
EUH 1001  Western Perspectives II
FIN 2104  Personal Financial Planning
GEA 2000  Nations and Regions of the World
GEB 1011  Introduction to Business
IDH 1041  Honors Core 2
INR 2002  International Politics
MMC 2000  Principles of Mass Communication
PLA 2013  Survey of American Law
SOW 2192  Understanding Relationships in the 21st Century
SYG 2010  Current Social Problems

**Humanities**

Choose one course from Group A and one additional course from either Group A or Group B 6

Group A

ARH 1000  Art Appreciation
LIT 2000  Introduction to Literature
MUL 2010  Music Appreciation
PHI 2010  Introduction to Philosophy
THE 2000  Theatre Appreciation

Group B

AML 2010  American Literature I
AML 2020  American Literature II
AML 2072  Sex, Money, and Power in American Literature
### Computing and Information Sciences

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<td>Western Survey II: Renaissance to Contemporary</td>
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### Natural Sciences

**Choose one course from Group A and one additional course from either Group A or Group B**

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<td>BSC 1005</td>
<td>General Biology for Non-Majors</td>
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<td>BSC 1085</td>
<td>Anatomy and Physiology I</td>
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<td>BSC 2010</td>
<td>Biology I</td>
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<tr>
<td>CHM 1020</td>
<td>Concepts in Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHM 2045</td>
<td>General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>ESC 2000</td>
<td>Introduction to Earth Science</td>
<td></td>
</tr>
<tr>
<td>EVR 2001</td>
<td>Introduction to Environmental Science</td>
<td></td>
</tr>
<tr>
<td>PHY 1020</td>
<td>Introduction to Concepts in Physics</td>
<td></td>
</tr>
<tr>
<td>PHY 2048</td>
<td>University Physics I</td>
<td></td>
</tr>
<tr>
<td>PHY 2048C</td>
<td>University Physics I - Studio</td>
<td></td>
</tr>
<tr>
<td>PHY 2053</td>
<td>General Physics I</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group B</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANT 2511</td>
<td>Biological Anthropology</td>
<td></td>
</tr>
<tr>
<td>BOT 2010</td>
<td>General Botany</td>
<td></td>
</tr>
<tr>
<td>BSC 1050</td>
<td>Fundamentals of Ecology</td>
<td></td>
</tr>
<tr>
<td>BSC 1086</td>
<td>Anatomy and Physiology II</td>
<td></td>
</tr>
<tr>
<td>BSC 2011</td>
<td>Biology II</td>
<td></td>
</tr>
<tr>
<td>BSC 2311</td>
<td>Introduction to Oceanography and Marine Biology</td>
<td></td>
</tr>
<tr>
<td>CGS 2060</td>
<td>Excursions in Computing</td>
<td></td>
</tr>
<tr>
<td>CHM 1032</td>
<td>Fundamentals of General Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHM 2046</td>
<td>General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CIS 2530</td>
<td>Introduction to Cyber Security</td>
<td></td>
</tr>
<tr>
<td>GEO 1200</td>
<td>Physical Geography</td>
<td></td>
</tr>
<tr>
<td>GLY 2010</td>
<td>Physical Geology</td>
<td></td>
</tr>
<tr>
<td>MCB 1000</td>
<td>Fundamentals of Microbiology</td>
<td></td>
</tr>
<tr>
<td>PHY 2049</td>
<td>University Physics II</td>
<td></td>
</tr>
<tr>
<td>PHY 2054</td>
<td>General Physics II</td>
<td></td>
</tr>
</tbody>
</table>

* May be taken with or without lab.

** General Physics is non-calculus based and is usually recommended for non-science majors. University Physics is calculus based and is usually recommended for science majors.

*** Although students receive 5 semester hours credit for PHY 2048C, an additional 3 semester science course will be needed to meet General Education requirements.

### General Education Electives

Choose an additional course from two of the three areas of Humanities, Social Sciences and Natural Sciences

The following courses are recommended to complete general education requirements:

**Humanities/Contemporary Values**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHI 2603</td>
<td>Ethics in Contemporary Society</td>
</tr>
<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus I</td>
</tr>
<tr>
<td>MAC 2312</td>
<td>Analytic Geometry and Calculus II</td>
</tr>
</tbody>
</table>

**Mathematics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 2048+L</td>
<td>University Physics I (+Lab)</td>
</tr>
<tr>
<td>PHY 2049+L</td>
<td>University Physics II (+Lab)</td>
</tr>
</tbody>
</table>

**Natural Science**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO 2013</td>
<td>Principles of Economics Macro</td>
</tr>
</tbody>
</table>

**Common Prerequisites**

State mandated common prerequisites must be completed prior to graduation, but are not required for admission to the program. See the Common Prerequisite Manual (https://dlss.flvc.org/admin-tools/common-prerequisites-manuals) for course substitutions from Florida colleges and universities.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COP XXXX</td>
<td>* Introductory programming in Ada, C, C++, Pascal, or equivalent language</td>
</tr>
<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus I</td>
</tr>
<tr>
<td>MAC 2312</td>
<td>Analytic Geometry and Calculus II</td>
</tr>
<tr>
<td>PHY 2048+L</td>
<td>University Physics I (+Lab)</td>
</tr>
<tr>
<td>PHY 2049+L</td>
<td>University Physics II (+Lab)</td>
</tr>
</tbody>
</table>

Two science courses for science majors 6

Total Hours 25

* Indicates common prerequisites which can be used to satisfy General Education requirements.

† Minimum grade of C is required for MAC 2311, MAC 2312 and PHY 2048/L

** A minimum grade of C- is required for COP XXXX

### Lower Division Electives (0-12 sh)

Students must complete sufficient 1000/2000 level electives to complete at least 60 sh in the lower division. Current UWF students may use elective courses at any level (1000-4000) to meet this elective requirement.

If not taken as a general education course, the following courses are recommended as lower division electives:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACG 2021</td>
<td>Principles of Financial Accounting</td>
</tr>
<tr>
<td>CGS 2060</td>
<td>Excursions in Computing</td>
</tr>
<tr>
<td>SPC 2608</td>
<td>Basic Communication Skills</td>
</tr>
<tr>
<td>ECO 2023</td>
<td>Principles of Economics Micro</td>
</tr>
</tbody>
</table>

Total Hours 0-12
If not taken as a general education course, the following courses are recommended as lower division electives:

ACG 2021 Principles of Financial Accounting 3
CGS 2060 Excursions in Computing 3
ECO 2023 Principles of Economics Micro 3
SPC 2608 Basic Communication Skills 3

**Major**

CDA 3101 Introduction to Computer Organization * 3
COP 3022 Intermediate Computer Programming * 3
COP 3014 Algorithm and Program Design * 3
COP 3530 Data Structures and Algorithms I * 3
COT 3100 Discrete Structures * 3
CEN 3031 Software Engineering I * 3
CEN 3032 Software Engineering II * 3
COP 4027 Advanced Computer Programming * 3
CEN 4053 Software Engineering Management * 3
CEN 4721 Human-Computer Interaction * 3
CEN 4400 Introduction to Operations Research * 3
CIS 4595C Capstone Systems Project * 3
CEN 4078 Secure Software Development * 3
COP 4710 Database Systems * 3
STA 4321 Introduction to Mathematical Statistics I 3
Choose one group of courses from the following groupings 6

- COP 4610 Theory and Fundamentals of Operating Systems *
- CNT 4007 Theory and Fundamentals of Networks
- COP 4634 Systems & Networks I *
- COP 4635 Systems & Networks II *

Total Hours 51

*Courses included in the major GPA

**Upper Division Electives**

One Departmental Approved Math course or a Science course for science majors 3

Choose two of the following 6

- COP 3665 iPhone/iPad Programming
- COP 4365C Advanced Topics in # Programming
- COP 4534 Data Structures and Algorithms II
- COP 4020 Programming Languages
- COP 4856 Distributed Software Architecture I
- COP 4857 Distributed Software Architecture II
- COP 4864 Client-Side Programming
- COP 3813 Server-Side Programming

Computer Science 3000/4000 level course in programming approved by advisor.

Total Hours 9

**Computer Science**

The Computer Science Minor provides students with knowledge of basic software aspects of computer systems. Fundamentals of programming experience utilizing procedural and object-oriented paradigms prepare students in this minor for software development on a variety of computing platforms. CS, CIS, SE, and Cybersecurity majors may not earn this minor.

COP 3014 Algorithm and Program Design 3
COP 3530 Data Structures and Algorithms I 3
COP 4634 Systems & Networks I 3
Advisor approved Computer Science elective 3
Choose one of the following: 3

- CDA 3101 Introduction to Computer Organization
- COP 4331 Object Oriented Programming
- COP 4534 Data Structures and Algorithms II
- COP 4420 Theory of Computation
- EEL 3701 Digital Logic and Computer Systems

Total Hours 15

*Students must complete all course work for the minor with a grade of "C-" or higher.

**Information Technology Minor**

The Information Technology Minor will enable students from all majors to acquire basic knowledge and skills in IT and computer applications. Students will learn the nature and source of electronically stored data, will have the opportunity to learn and apply a variety of software programs, and will enhance computer skills appropriate to their fields of study. All majors except CS, CIS, SE and Cybersecurity majors may earn this minor.

CEN 4721 Human-Computer Interaction 3
COP 2253 Programming Using Java 3
COP 3022 Intermediate Computer Programming 3
COP 4710 Database Systems 3
COP 4856 Distributed Software Architecture I 3
Choose one of the following: 3-4

- MAC 2233 Calculus with Business Applications
- MAC 2311 Analytic Geometry and Calculus I

Total Hours 18-19

*Students must complete all course work for the minor with a grade of "C-" or higher.

**Information Technology Minor**

The Information Technology Minor will enable students from all majors to acquire basic knowledge and skills in IT and computer applications. Students will learn the nature and source of electronically stored data, will have the opportunity to learn and apply a variety of software programs, and will enhance computer skills appropriate to their fields of study. All majors except IT, CS, CIS, SE and Cybersecurity majors may earn this minor.

CGS 2570 Personal Computer Applications 3
Choose one of the following: 3

- CGS 3464 Programming Computer Applications
- COP 2253 Programming Using Visual Basic for Non-Majors
- COP 2334 Programming Using C++

Required courses: 6

- COP 2830 Script Programming
- CGS 3604 Applications of Information Technology
Select any two: 6

- CNT 4014C IT Administration
Database Systems Certificate

Department: Computer Science

Method of Instruction: Online

Semester Hours: 12

The undergraduate certificate in Database Systems is designed to provide both theory and practical knowledge in database design, development and implementation, advanced database concepts, database administration, as well as data mining. In-depth practice in the use of Structure Query Language (SQL) will also be provided. It will prepare one to be a database professional, or work in any other information system career in which knowledge of capturing, storing, retrieving, organizing, and analyzing information is important. The departmental certificate application, available on the Computer Science website, should be submitted before the drop/add period of the semester of completion. All courses must have been completed within 5 years of receipt of application with a grade of "C-" or higher. Cybersecurity majors may not earn this certificate.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COP 4710</td>
<td>Database Systems</td>
<td>3</td>
</tr>
<tr>
<td>CTS 4817</td>
<td>Web Server Administration</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Geospatial Cybersecurity Certificate

Department: Computer Science

Semester Hours: 22

The Geospatial Cybersecurity certificate combines foundational courses in computer programming, database and cybersecurity with the specialized study of geographic information systems. This program is designed to address the need for Cybersecurity GIS applications related to business, geospatial intelligence, education, healthcare, and numerous other employment fields.

As part of the coursework, students will be provided with the opportunity to become technically proficient in a variety of geospatial technologies and applications through hands-on instruction. The program focuses on Geographic Information Science, programming, database, data mining, and cybersecurity concepts, computational modeling, automation, and implementation of customized GIS applications. The proposed courses have been carefully combined to reflect the real-world requirements needed for careers in the cybersecurity applications of geospatial sciences. With 100 percent of the coursework offered online, this program is designed to meet the needs of recent graduates looking to enter the workforce and those working professionals who did not acquire a computational Cybersecurity GIS background as part of their primary academic training while they continue to hold their position in their chosen field.

Program Requirements

In addition to meeting general UWF requirements, participants must successfully complete the prescribed courses earning a grade of "C" or better in each course, and secure a combined grade point average of 2.5 or higher for the courses required by the certificate.

The certificate is composed of seven courses for a total of 22 semester hours, as shown below.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP 4770</td>
<td>Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>COP 4723</td>
<td>Database Administration</td>
<td>3</td>
</tr>
<tr>
<td>CIS 4368</td>
<td>Introduction to Database Security</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Cybersecurity Certificate

Department: Computer Science

Method of Instruction: Classroom

Semester Hours: 15

This certificate program is focused on networking and security, prepares professionals to become Cybersecurity Specialists. In this certificate students develop technical and problem-solving skills to help organizations defend their network systems. The departmental certificate application, available on the Computer Science website, should be submitted before the drop/add period of the semester of completion. All courses must have been completed within 5 years of receipt of application with a grade of "C-" or higher. Cybersecurity majors may not earn this certificate.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNT 4007</td>
<td>Theory and Fundamentals of Networks</td>
<td>3</td>
</tr>
<tr>
<td>COP 4634</td>
<td>Systems &amp; Networks I</td>
<td>3</td>
</tr>
<tr>
<td>COP 4610</td>
<td>Theory and Fundamentals of Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>COP 4635</td>
<td>Systems &amp; Networks II</td>
<td>3</td>
</tr>
<tr>
<td>COP 3022</td>
<td>Intermediate Computer Programming</td>
<td>3</td>
</tr>
<tr>
<td>Choose two:</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>CNT 4403</td>
<td>Computer and Network Security</td>
<td>3</td>
</tr>
<tr>
<td>CIS 4368</td>
<td>Introduction to Database Security</td>
<td>3</td>
</tr>
<tr>
<td>CEN 4078</td>
<td>Secure Software Development</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
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<td>15</td>
</tr>
</tbody>
</table>

Select one of the following Programming prerequisites: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGS 3464</td>
<td>Programming Using Visual Basic for Non-Majors</td>
<td>3</td>
</tr>
<tr>
<td>GIS 4102</td>
<td>GIS Programming</td>
<td>3</td>
</tr>
<tr>
<td>COP 2334</td>
<td>Programming Using C++</td>
<td>3</td>
</tr>
<tr>
<td>COP 2253</td>
<td>Programming Using Java</td>
<td>3</td>
</tr>
<tr>
<td>Required courses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COP 4710</td>
<td>Database Systems</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>
Cybersecurity Fundamentals Certificate

This certificate program is designed to provide a basic understanding of the principles of Computer and Network Security. It will address security challenges faced by Information Systems and how to effectively protect them against malicious attacks. It will prepare one to be a Cybersecurity professional, or work in an Information Systems career in which he/she can identify vulnerabilities and design appropriate security countermeasures to defend against threats.

The departmental certificate application, available on the Computer Science website, should be submitted before the drop/add period of the semester of completion. All courses must have been completed within 5 years of the receipt of application with a grade of "C-" or higher. All other majors except CS, CIS, SE and Cybersecurity majors will be able to earn this certificate.

Required Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COP 1000</td>
<td>Introduction to Programming</td>
<td>3</td>
</tr>
<tr>
<td>CNT 1000</td>
<td>Introduction to Networking</td>
<td>3</td>
</tr>
<tr>
<td>CNT 1401</td>
<td>Cybersecurity Fundamentals I</td>
<td>3</td>
</tr>
<tr>
<td>CTS 1120</td>
<td>Introduction to Network Security</td>
<td>3</td>
</tr>
<tr>
<td>CNT 2402</td>
<td>Cybersecurity Fundamentals II</td>
<td>3</td>
</tr>
<tr>
<td>CIS 2352</td>
<td>Introduction to Ethical Hacking</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

Geospatial Computing Certificate

Department: Environmental Science

Semester Hours: 22

The Certificate in Geospatial Computing combines foundation computer programming, database and web programming concepts with the specialized study of geographic information systems. This program is designed to address the need for customized GIS desktop and web-based applications related to business, geospatial intelligence, education, healthcare, and numerous other employment fields.

As part of the coursework, students will be provided with the opportunity to become technically proficient in a variety of geospatial technologies and applications through hands-on instruction. The program focuses on Geographic Information Science, data mining, programming, database concepts, computational modeling, automation, and implementation of customized GIS applications. The proposed courses have been carefully combined to reflect the real-world requirements needed for careers in the geospatial sciences. With 100 percent of the coursework offered online, this program is designed to meet the needs of recent graduates looking to enter the workforce and those working professionals who did not acquire a computational GIS background as part of their primary academic training while they continue to hold their position in their chosen field.

Program Requirements

In addition to meeting general UWF requirements, participants must successfully complete the prescribed courses earning a grade of "C-" or better in each course, and secure a combined grade point average of 2.5 or higher for the courses required by the certificate.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS 4043+L</td>
<td>Geographic Information Systems (+Lab)</td>
<td>4</td>
</tr>
<tr>
<td>GIS 4048</td>
<td>Applications in Geographic Information Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours</strong></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>