

COLLEGE OF ARTS AND SCIENCES

The College of Arts and Sciences is a diverse community of educators, students, and researchers from across the country and around the world who work together to advance the boundaries of human knowledge, foster critical thinking skills, promote intellectual inquiry, and develop an understanding of different human cultures necessary to become engaged global citizens.

These goals compel a commitment to creativity and inquiry free of bias and based upon the principles of objective scholarship. They require a responsibility to promote and convey those elements of the liberal arts and sciences that must be essential components of the educational goals of all units of the university. The college seeks richness through diversity of its programs and strength through erudition.

The College of Arts & Sciences is the university's largest and oldest; it teaches the most students, and provides the backbone for Troy University's educational and research missions. As a result, you will find a broad array of academic programs that will pre-

pare you for careers in public and private sectors as well as post-graduate and professional schools. These programs emphasize the core values of a classic liberal arts education, as well as the skills and flexibility one will need to meet the challenges of the 21st-century workplace.

A degree from the College of Arts & Sciences is much more than preparation for a career—it is preparation for a complete, rich, and rewarding life.

In addition to general studies courses, major courses and minor courses, sufficient free electives should be chosen to total at least 120 hours.

As part of ongoing planning and evaluation, the College of Arts and Sciences regularly evaluates student learning outcomes for each degree program.

ACCELERATED LAW CURRICULUM (58 HOURS)

1. Students interested in the Accelerated Law Curriculum must complete the requirements for a major in Anthropology, Criminal Justice, History, Political Science, Social Science, or Sociology by the end of the third year of study at Troy University (or semester prior to attending partnered institution)
2. Students interested in the Accelerated Law Curriculum must meet the admission requirements and be accepted to a partnered institution. Students must take the LSAT exam as part of the admissions requirement.
3. Students must successfully complete 30 semester hours of law courses outlined by the partnered institution in order to receive Troy University credit.
4. In addition to completing the major requirements, students must minor in Legal Studies
5. Students will receive both a faculty adviser for their declared major as well as an adviser for the Accelerated Law program.
6. For the Legal Studies Minor (18 hours)- Students must complete the following classes at Troy University:

LGL 2200	(3)	Introduction to Legal Studies
LGL 3300	(3)	Legal Research and Writing
LGL 4400	(3)	Seminar in Legal Studies

The following 9 hours will be completed at the partnered law school and transferred to Troy University to complete the minor:

Mississippi College of Law

LAW 502	(3)	Torts
LAW 582	(2)	Legal Analysis and Communication I
LAW 580	(1)	Legal Research I
LAW 583	(2)	Legal Analysis and Communication II
LAW 581	(1)	Legal Research II

Cumberland School of Law, Stanford University

Lawyering and Legal Reasoning I — 3 credit hours
Lawyering and Legal Reasoning II — 3 credit hours
Evidence — 3 credit hours

Jones School of Law, Faulkner University

Legal Reasoning, Writing, & Research — 3 credit hours
Foundations of Law — 3 credit hours
Foundations of Legal Prof. — 1 credit hour
Legal Analysis and Persuasion — 2 credit hours

7. Upon successful completion of the designated 30 semester hours of courses at the partnered institution, students may be

awarded a Bachelor's Degree in one of the designated majors with a minor in Legal Studies.

AIR FORCE ROTC/AEROSPACE STUDIES MINOR (18 HOURS)

AS 3312	(3)	Air Force Leadership Studies I
AS 3313	(3)	Air Force Leadership Studies II
AS 4412	(3)	National Security Affairs/Preparation for Active Duty I
AS 4413	(3)	National Security Affairs/Preparation for Active Duty II

Select two three-hour courses from upper-level political science (POL) courses, or substitute upper-level courses from history (HIS), geography (GEO), or social science (SS) courses with the approval of the Department of Aerospace Studies chair.

**Students pursuing an Air Force ROTC Commission must also take the following Labs:*

AS L312	(1)	Leadership Laboratory I
AS L313	(1)	Leadership Laboratory II
AS L412	(1)	Leadership Laboratory I
AS L413	(1)	Leadership Laboratory II

ANTHROPOLOGY MAJOR (36 HOURS)

Area IV

Anthropology majors should take Area IV electives appropriate for their major.

Area V

ANT 2200	(3)	Anthropology
STAT 2210	(3)	Introductory Statistics

Major Requirements:

ANT 3305	(3)	Introduction to Archaeology
ANT 3310	(3)	Cultural Anthropology
ANT 3311	(3)	Physical Anthropology
ANT 3340	(3)	Language in Culture and Society
ANT 3376	(3)	Anthropological Statistics
ANT 4498	(3)	Anthropological Theory

Select at least 18 hours of additional 3000/4000 level anthropology courses as approved by your faculty adviser

Accelerated Law Curriculum Option:

Students majoring in Anthropology and Legal Studies as a minor may select the Accelerated Law Curriculum Option. See the Accelerated Law Curriculum section the catalog for more information.

12 hours of Law courses will be transferred from the partnered law institution

The following nine (9) hours from the partnered institution will be transferred into the Anthropology Major electives:

Civil Procedure I — 3 credit hours
Civil Procedure II — 3 credit hours
Criminal Law — 3 credit hours

ANTHROPOLOGY MINOR (18 HOURS)

ANT 2200 (3) Introduction to Anthropology

Select at least 15 hours of additional 3000/4000-level anthropology courses as approved by your faculty adviser.

ARCHAEOLOGY MINOR (18 HOURS)

Required Courses:

A grade of "C" or better is required

ANT 3305 (3) Introduction to Archaeology
ANT 3312 (3) Field Techniques in Archaeology
ANT 4460 (3) Archaeological Theory

An additional 9 hours from 3000/4000 level courses can be selected from the following departments: Art History, Classics, Geomatics, GIS, Geography, History, Philosophy, Religion, and approved by an Anthropology faculty

AVIATION OPERATIONS MINOR (18 HOURS)

Rotary Emphasis and Fixed Wing Emphasis – Equivalent credit toward the completion of the Aviation Operations minor/ Rotary emphasis and the Aviation Operations minor/Fixed Wing emphasis may be earned through Federal Aviation Administration (FAA) certification and licensure in such areas as private pilot, commercial pilot and flight instruction.

For information regarding the Rotary emphasis and Fixed Wing emphasis of the Aviation Operations minor, contact the Dean of Undergraduate and First Year Studies in 117 Eldridge Hall, Troy Campus.

BACHELOR OF APPLIED SCIENCE IN RESOURCE AND TECHNOLOGY MANAGEMENT (36 HOURS)

Area IV Requirements

Choose six credit hours from the following:

ANT 2200 (3) Anthropology
CJ 1101 (3) Introduction to Criminal Justice
ECO 2251 (3) Principles of Macroeconomics
ECO 2252 (3) Principles of Microeconomics
GEO 2210 (3) World Regional Geography
LDR 1100 (3) Introduction to Leadership
PHI 2205 (3) Introduction to Logic
PHI 2210 (3) Critical Thinking
SOC 2275 (3) Introduction to Sociology

Area V Requirements

TROY 1101 (1) The University Experience
IS 2241 (3) Computer Concepts and Applications

Required Core Courses (18 Hours)

MGT 3300 (3) Principles of Management
PHI 3310 (3) Applied Ethics
SCI 3365 (3) Principles of Applied Science
SS 3375 (3) Research Methods in the Social Sciences
SS 3376 (3) Statistical Applications of Social Science Inquiry
GIS 3390 (3) Fundamentals of Geographical Information and Analysis

Select a minimum of 18 semester hours from the courses listed below:

BIO 3340 (3) Evolution
CJ 3335 (3) Security Operations
CS 3310 (3) Foundations of Computer Science
ECO 3351 (3) Intermediate Macroeconomics
ECO 3352 (3) Intermediate Microeconomics
GIS 3301 (3) Cartography and Geovisualization

GIS 3305 (3) Spatial Information and Analysis
HS 3310 (3) Human Behavior in the Social Environment I
POL 3300 (3) Foundations of Political Science
POL 3343 (3) American Political Processes
POL 3364 (3) State and Local Politics
PSY 4410 (3) Industrial/Organization Psychology
SCI 4450 (3) Science in a Regulatory Environment
SOC 4406 (3) Urban Sociology
SOC 4413 (3) Sociology of Race and Ethnicity
SOC 4421 (3) Social Inequality
SOC 4445 (3) Trends in Globalization
SWK 3320 (3) Human Behavior in the Social Environment II

OR

Transfer of *Specialized technical courses. (not to exceed 18 semester hours.)

*Specialized technical courses.

Credit will be awarded for specialized technical knowledge based upon American Council of Education (A.C.E.) credit recommendations or transfer work from regionally accredited (Southern Association of Colleges and Schools, Middle States Association of Colleges and Schools, etc.) post-secondary community college, or technical schools as approved by the Academic Council. Specializations are not available in fields of study that are offered through Troy University as majors, programs, or minors, e.g., nursing, computer science, information systems, or education. Exceptions to the use of a Troy University minor are the programs in Aviation Operations and Advanced Professional Flight. Program requirements for either minor may be used to satisfy the 18 hours of specialized technical courses.

Eligibility

Eligibility for enrollment in one of the applied science degree programs is dependent upon prior education and/or experience. Before enrollment in one of the programs, official documentation of prior learning must be submitted to determine eligibility. All post-secondary technical school transfer students must complete all courses required in the institution's curriculum and earn (if appropriate) a diploma or certificate before being granted admission into the resources management degree program. No additional credit will be awarded for the possession of a license (i.e., all credit awarded is based on documentation of training and evaluation leading to the issue of a license, not the mere possession of a license). All credit from the Community College of the Air Force (CCAF), accredited post secondary technical schools, and/or American Council on Education (ACE) recommendations will be considered junior college credit except where specifically recommended by ACE for upper-division credit. No credit will be awarded until six semester hours of academic credit has been earned at Troy University. At least 50 percent of the degree program must be traditional academic credit at the 3300/4400 level. Curriculum: The academic curricula taught by the university have been developed to supplement, not duplicate, the vocational/technical training or other experiential learning the individual may possess in a manner designed to provide these individuals greater career opportunities.

BIOLOGY EDUCATION

Students seeking Alabama teacher certification should select biology as a first major and education as a second major. Students should consult with their advisers concerning all certification requirements.

BIOLOGY MAJOR (44 HOURS)

*Special Topics in Biology (BIO 4476), Guided Independent Studies (BIO 4491/4492) and Guided Independent Research (BIO 4493, 4494) may only be taken for a maximum of 6 semester hours.

Specialized General Studies Requirements

General studies requirements for the biology, environmental science, biomedical sciences, and marine biology programs and the biology major total 64 semester hours. See the General Studies section of this catalog for complete general studies information.

Area III

BIO 1100 (3) Principles of Biology
BIO L100 (1) Principles of Biology Lab

CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
MTH 1125	(4)	Calculus I

Area V Requirements

BIO 1101	(3)	Organismal Biology
BIO L101	(1)	Organismal Biology Lab
CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab
IS 2241	(3)	Computer Concepts and Applications
TROY 1101	(1)	The University Experience

Select one sequence:

PHY 2252	(3)	General Physics I
PHY L252	(1)	General Physics I Lab
PHY 2253	(3)	General Physics II
PHY L253	(1)	General Physics II Lab
OR		
PHY 2262	(3)	Physics I with Calculus
PHY L262	(1)	Physics I with Calculus Lab
PHY 2263	(3)	Physics II with Calculus
PHY L263	(1)	Physics II with Calculus Lab

Major Requirements

BIO 2220	(3)	Principles of Cell Biology
BIO 2229	(3)	General Ecology
BIO L229	(1)	General Ecology Lab
BIO 3320	(3)	Genetics
BIO 4484	(1)	Senior Seminar in Biological & Environmental Sciences

CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
CHM 3343	(3)	Organic Chemistry II
CHM L343	(1)	Organic Chemistry II Lab

OR

CHM 3352	(3)	Biochemistry
CHM L352	(1)	Biochemistry Lab
STAT 2210	(3)	Introductory Statistics

Complete one botany course with its corresponding lab:

BIO 3325	(3)	Plant Form and Function
BIO L325	(1)	Plant Form and Function Lab
BIO 4425	(4)	Field Botany

Complete one zoology course with its corresponding lab:

BIO 3307	(3)	Invertebrate Zoology
BIO L307	(1)	Invertebrate Zoology Lab
BIO 4405	(4)	Entomology
BIO 4420	(4)	Field Vertebrate Zoology
BIO 4447	(3)	Ornithology
BIO L447	(1)	Ornithology Lab
BIO 4471	(3)	Parasitology
BIO L471	(1)	Parasitology Lab

Complete one ecology/environmental course with its corresponding lab:

BIO 4413	(3)	Limnology
BIO L413	(1)	Limnology Lab
BIO 4416	(3)	Microbial Ecology
BIO L416	(1)	Microbial Ecology Lab
BIO 4421	(3)	Population Ecology
BIO L421	(1)	Population Ecology Lab
BIO 4479	(3)	Environmental Assessment
BIO L479	(1)	Environmental Assessment Lab

Complete one physiology/cell/molecular course with its corresponding lab:

BIO 3347	(3)	Human Anatomy and Physiology I
BIO L347	(1)	Human Anatomy and Physiology I Lab
BIO 3348	(3)	Human Anatomy and Physiology II
BIO L348	(1)	Human Anatomy and Physiology II Lab

BIO 3372	(3)	Microbiology
BIO L372	(1)	Microbiology Lab
BIO 3382	(3)	Immunology
BIO L382	(1)	Immunology Lab
BIO 3386	(3)	Hematology
BIO L386	(1)	Hematology Lab
BIO 4414	(3)	Food Microbiology
BIO L414	(1)	Food Microbiology Lab
BIO 4451	(3)	Toxicology
BIO L451	(1)	Toxicology Lab
BIO 4480	(3)	Histology
BIO L480	(1)	Histology Lab
BIO 4482	(3)	Molecular Biology
BIO L482	(1)	Molecular Biology Lab

Complete one upper-level adviser-approved biology course and its corresponding lab.

BIOLOGY MINOR (18-20 HOURS)

Lectures and the corresponding labs must be taken together:

BIO 1101	(3)	Organismal Biology
BIO L101	(1)	Organismal Biology Lab
BIO 2220	(3)	Principles of Cell Biology
BIO L220	(1)	Principles of Cell Biology Lab

Complete 10 to 12 additional semester hours of approved upper-level (3300 or above) biology courses with corresponding labs.

BIOLOGY/BIOMEDICAL SCIENCES (56 HOURS)

**Special Topics in Biology (BIO 4476), Guided Independent Studies (BIO 4491/4492) and Guided Independent Research (BIO 4493, 4494) may only be taken for a maximum of 6 semester hours*

Specialized General Studies Requirements**Area III**

BIO 1100	(3)	Principles of Biology
BIO L100	(1)	Principles of Biology Lab
CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
MTH 1125	(4)	Calculus I

Area V Requirements

IS 2241	(3)	Computer Concepts and Applications
TROY 1101	(1)	The University Experience
BIO 1101	(3)	Organismal Biology
BIO L101	(1)	Organismal Biology Lab
CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab

Complete one sequence (physics sequence not required for medical technology concentration):

PHY 2252	(3)	General Physics I
PHY L252	(1)	General Physics I Lab
PHY 2253	(3)	General Physics II
PHY L253	(1)	General Physics II Lab
OR		
PHY 2262	(3)	Physics I with Calculus
PHY L262	(1)	Physics I with Calculus Lab
PHY 2263	(3)	Physics II with Calculus
PHY L263	(1)	Physics II with Calculus Lab

Requirements

BIO 2220	(3)	Principles of Cell Biology
BIO 2229	(3)	General Ecology
BIO L229	(1)	General Ecology Lab
BIO 3320	(3)	Genetics
BIO 4484	(1)	Senior Seminar in Biological & Environment Sciences
CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
CHM 3343	(3)	Organic Chemistry II
CHM L343	(1)	Organic Chemistry II Lab

OR

CHM 3352	(3)	Biochemistry
CHM L352	(1)	Biochemistry Lab
STAT 2210	(3)	Introductory Statistics

Take an additional 32-34 hours in approved upper level biology, biochemistry (CHM 3352), or marine science biology courses.

CHEMISTRY EDUCATION

Students seeking Alabama teacher certification should select chemistry as a first major and education as a second major. Students should consult with their advisers concerning all certification requirements. CHM 3352 is required for Alabama teacher certification.

CHEMISTRY MAJOR (37 HOURS)

Specialized General Studies Requirements

Area III

BIO 1100	(3)	Principles of Biology
BIO L100	(1)	Principles of Biology Lab
CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
MTH 1125	(4)	Calculus I

Area V Requirements

IS 2241	(3)	Computer Concepts and Applications
MTH 1126	(4)	Calculus II
*PHY 2262	(3)	Physics I with Calculus
*PHY L262	(1)	Physics I with Calculus Lab
*PHY 2263	(3)	Physics II with Calculus
*PHY L263	(1)	Physics II with Calculus Lab
TROY 1101	(1)	The University Experience

*Chemistry majors minoring in Physics may replace these with free electives.

* Chemistry majors minoring in Mathematics may replace MTH 1126 with free electives.

Required Courses (31 Hours)

CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab
CHM 2242	(3)	Analytical Chemistry
CHM L242	(1)	Analytical Chemistry Lab
CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
CHM 3343	(3)	Organic Chemistry II
CHM L343	(1)	Organic Chemistry II Lab
CHM 3381	(3)	Physical Chemistry I
CHM L381	(1)	Physical Chemistry I Lab
CHM 3382	(3)	Physical Chemistry II
CHM 4444	(3)	Advanced Inorganic Chemistry
CHM L444	(1)	Advanced Inorganic Chemistry Lab
CHM 4445	(3)	Instrumental Analysis
CHM L445	(1)	Instrumental Analysis Lab

Complete 6 hours of the following electives:

CHM 3352	(3)	Biochemistry
CHM L352	(1)	Biochemistry Lab
CHM L382	(1)	Physical Chemistry II Lab
CHM 4400	(3)	Special Topics in Chemistry
CHM 4403	(3)	Advanced Organic Chemistry
CHM 4420	(3)	Principles of Polymer Chemistry
CHM L420	(1)	Principles of Polymer Chemistry Lab
CHM 4452	(3)	Advanced Biochemistry
CHM 4491/2	(1-3)	Guided Independent Research
CHM 4493/4	(1-3)	Guided Independent Study
CHM 4499	(1)	Senior Research Seminar
STAT 2210	(3)	Introductory Statistics

CHEMISTRY MINOR (20 HOURS)

CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
CHM 1143	(3)	General Chemistry II

CHM L143	(1)	General Chemistry II Lab
CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
CHM 3343	(3)	Organic Chemistry II
CHM L343	(1)	Organic Chemistry II Lab

Select four additional hours of advanced chemistry courses, such as:

CHM 2242	(3)	Analytical Chemistry
CHM L242	(1)	Analytical Chemistry Lab
CHM 3352	(3)	Biochemistry
CHM L352	(1)	Biochemistry Lab

COMPREHENSIVE GENERAL SCIENCE PROGRAM (34 HOURS)

Specialized General Studies Requirements

Area III

BIO 1100	(3)	Principles of Biology
BIO L100	(1)	Principles of Biology Lab
CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
MTH 1125	(4)	Calculus I

Area V

IS 2241	(3)	Computer Concepts/Applications
PHY 2262	(3)	Physics I w/Calculus
PHY L262	(1)	Physics I w/Calculus Lab
SCI 2234	(3)	Earth & Space Science
SCI L234	(1)	Earth & Space Science Lab
TROY 1101	(1)	The University Experience

Required Courses:

BIO 2220	(3)	Principles of Cell Biology
BIO L220	(1)	Principles of Cell Biology Lab
BIO 3320	(3)	Genetics
BIO L320	(1)	Genetics Lab
BIO 3347	(3)	Human Anatomy & Physiology I
BIO L347	(1)	Human Anatomy & Physiology I Lab
CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab
CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
GEO 3300	(3)	Principles of Physical Geography
STAT 2210	(3)	Introductory Statistics
PHY 2263	(3)	Physics II w/Calculus
PHY L263	(1)	Physics II w/Calculus Lab
PHY 3310	(3)	Modern Physics
PHY L310	(1)	Modern Physics Lab
PHY 3359	(3)	Waves and Optics
PHY L359	(1)	Waves and Optics Lab

COMPUTER SCIENCE MINOR (18 HOURS)

CS 2250	(3)	Computer Science I
CS 2255	(3)	Computer Science II

Select 12 semester hours of computer science courses with at least one course being at the 4000 level.

COMPUTER SCIENCE PROGRAM (48 HOURS)

Specialized General Studies Requirements

Area III

MTH 1125	(4)	Calculus I, in lieu of MTH 1110
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Select a four hour course/lab combination from the following: (Students must complete an eight hour sequence in chemistry or physics. Also see Area V Requirements.)

CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
SCI 2233	(3)	Physical Science
SCI L233	(1)	Physical Science Lab

PHY 2252	(3)	General Physics I
PHY L252	(1)	General Physics I Lab
PHY 2262	(3)	Physics I with Calculus
PHY L262	(1)	Physics I with Calculus Lab

Select remaining Area III courses as shown in the General Studies section of this catalog.

Area V Requirements

CS 2250	(3)	Computer Science I
MTH 1126	(4)	Calculus II
TROY 1101	(1)	The University Experience

Select a four hour course/lab combination from the following:

(Students must complete an eight hour sequence in chemistry or physics. Students completing Physical Science in Area III must take Earth and Space Science lecture/lab combination or Principles of Astronomy; Stars, Galaxies, and Cosmology lecture/lab combination.)

CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab
PHY 2253	(3)	General Physics II
PHY L253	(1)	General Physics II Lab
PHY 2263	(3)	Physics II with Calculus
PHY L263	(1)	Physics II with Calculus Lab
SCI 2234	(3)	Earth and Space Science
SCI L234	(1)	Earth and Space Science Lab
OR		
SCI 2240	(3)	Principles of Astronomy; Stars, Galaxies, and Cosmology
SCI L240	(1)	Principles of Astronomy; Stars, Galaxies, and Cosmology Lab

Required Courses:

CS 2255	(3)	Computer Science II
CS 3310	(3)	Foundations of Computer Science
CS 3323	(3)	Data Structures
CS 3329	(3)	Analysis of Algorithms
CS 3332	(3)	Software Engineering I
CS 3360	(3)	Concepts of Object-Oriented Programming I
CS 3365	(3)	Introduction to Computer Organization and Architectures
CS 3370	(3)	Nature of Programming Languages
CS 3372	(3)	Formal Languages and the Theory of Computation
CS 4420	(3)	Introduction to Database Systems
CS 4445	(3)	Data Communication and Networking
CS 4448	(3)	Operating Systems
STAT 2210	(3)	Introductory Statistics
MTH 2215	(3)	Applied Discrete Mathematics

Select two of the following:

CS 3320	(3)	Business Systems Programming
CS 3325	(3)	Operations Research
CS 3331	(3)	Fundamentals of Artificial Intelligence
CS 3361	(3)	Concepts of Objected Oriented Programming II
CS 4401	(3)	Advanced Artificial Intelligence
CS 4443	(3)	Web Based Software Development
CS 4447	(3)	Systems Analysis and Design
CS 4451	(3)	Computer Security and Reliability
CS 4461	(3)	Software Engineering II
CS 4462	(3)	Special Topics in Object-Oriented Technology
CS 4495	(3)	Special Topics in Computer Science

**COMPUTER SCIENCE, APPLIED MAJOR
(36 HOURS)**

Specialized General Studies Requirements

Area III

MTH 2201	(3)	Calculus and its Applications
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Select additional Area III requirements as shown in the General

Studies section of this catalog.

Area V Requirements

IS 2241	(3)	Computer Concepts and Applications
MTH 2215	(3)	Applied Discrete Mathematics
TROY 1101	(1)	The University Experience

Major Requirements:

CS 2250	(3)	Computer Science I
CS 2255	(3)	Computer Science II
CS 2265	(3)	Advanced Programming I
CS 3330	(3)	Data Structures and Algorithms
CS 4420	(3)	Introduction to Database Systems
CS 4443	(3)	Web-Based Software Development
CS 4445	(3)	Data Communications and Networking
CS 4447	(3)	Systems Analysis and Design
CS 4448	(3)	Operating Systems

Select three of the following:

CS 3320	(3)	Business Systems Programming
CS 3332	(3)	Software Engineering I
CS 3347	(3)	Advanced Programming II
CS 4449	(3)	Applied Networking
CS 4451	(3)	Computer Security
CS 4495	(3)	Special Topics in Computer Science
CS 4499	(1-3)	Internship in Computer Science
CS 4480	(3)	Study Abroad in Computer Science
CS 4410	(3)	Introduction to Machine Learning

**COMPUTER SCIENCE ASSOCIATE OF SCIENCE
DEGREE (60 HOURS)**

See the academic regulations section of this catalog for additional information regarding associate degrees.

General Studies Requirements

Area I

ENG 1101	(3)	Composition and Modern English I
ENG 1102	(3)	Composition and Modern English II

Area II

Select one of the following:

ENG 2205	(3)	World Literature before 1660
ENG 2206	(3)	World Literature after 1660
ENG 2211	(3)	American Literature before 1875
ENG 2212	(3)	American Literature after 1875
ENG 2244	(3)	British Literature before 1785
ENG 2245	(3)	British Literature after 1785

Select one of the following:

ART 1133	(3)	Visual Arts
THE 1130	(3)	Introduction to Theatre
MUS 1131	(3)	Music Appreciation

Area III

MTH 1125	(4)	Calculus I
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Select one science course and corresponding lab:

BIO 1100	(3)	Principles of Biology
BIO L100	(1)	Principles of Biology Lab
SCI 2233	(3)	Physical Science
SCI L233	(1)	Physical Science Lab
SCI 2234	(3)	Earth and Space Science
SCI L234	(1)	Earth and Space Science Lab

Area IV

Select one of the following:

HIS 1101	(3)	Western Civilization I
HIS 1102	(3)	Western Civilization II
HIS 1111	(3)	U.S. to 1877
HIS 1112	(3)	U.S. since 1877
HIS 1122	(3)	World History to 1500

HIS 1123 (3) World History from 1500

Area V

IS 2241 (3) Computer Concepts and Applications
TROY 1101 (1) The University Experience

Additional requirements

CS 2250 (3) Computer Science I
CS 2255 (3) Computer Science II
CS 3310 (3) Foundations of Computer Science
CS 3323 (3) Data Structures
CS 3329 (3) Analysis of Algorithms
CS 3332 (3) Software Engineering I
CS 3365 (3) Introduction to Computer Organization and Architectures
MTH 2215 (3) Applied Discrete Mathematics

Select 9 hours of free electives.

CRIMINAL JUSTICE MAJOR (36 HOURS)

Criminal justice majors are encouraged to take two semesters of Spanish or another foreign language as part of their general studies requirements.

Area IV

CJ 2221 (3) Survey of Law Enforcement
CJ 2231 (3) Survey of Corrections

Area V

CJ 2241 (3) Survey of Law and Criminal Procedure

Required Courses:

CJ 1101 (3) Introduction to Criminal Justice and Criminology
CJ 1110 (3) Careers in Criminal Justice
CJ 3352 (3) Constitutional Law
CJ 3375 (3) Research Methods
CJ 4498 (3) Criminological Theory

Select 21 additional hours of upper-level (3000-4000) Criminal Justice courses, as approved by the advisor for the major.

Accelerated Law Curriculum Option:

Students majoring in Criminal Justice and Legal Studies as a minor may select the Accelerated Law Curriculum Option. See the Accelerated Law Curriculum section the catalog for more information.

15 hours of Law courses will be transferred from the partnered law institution

The following six (6) hours from the partnered institution will be transferred into the Criminal Justice Major electives:

Civil Procedure I — 3 credit hours
Civil Procedure II — 3 credit hours

CRIMINAL JUSTICE MINOR (18 HOURS)

CJ 1101 (3) Introduction to Criminal Justice and Criminology

Select 15 additional hours of upper-level criminal justice courses as approved by the adviser.

CYBER SECURITY PROGRAM

Specialized General Studies Requirements**Area III**

MTH 1125 (4) Calculus I

Select a four hour course/lab combination from the following:

CHM 1142 (3) General Chemistry I

CHM L142 (1) General Chemistry I Lab
SCI 2233 (3) Physical Science
SCI L233 (1) Physical Science Lab
PHY 2252 (3) General Physics I
PHY L252 (1) General Physics I Lab
PHY 2262 (3) Physics I with Calculus
PHY L262 (1) Physics I with Calculus Lab

Select remaining Area III courses as shown in the General Studies section of this catalog

Area V

TROY 1101 (1) The University Experience
STAT 2210 (3) Introduction to Statistics
CS 2250 (3) Computer Science I

Select a four hours course/lab combination from the following:

(Students must complete an eight hour sequence in chemistry of physics. Students completing Physical Science in Area III must take Earth and Space Science lecture/lab combination or Principles of Astronomy; Stars, Galaxies, and Cosmology lecture/lab combination.)

CHM 1143 (3) General Chemistry II
CHM L143 (1) General Chemistry II Lab
PHY 2253 (3) General Physics II
PHY L253 (1) General Physics II Lab
PHY 2263 (3) Physics II with Calculus
PHY L263 (1) Physics II with Calculus Lab
SCI 2234 (3) Earth and Space Science
SCI L234 (1) Earth and Space Science Lab

OR

SCI 2240 (3) Principles of Astronomy; Stars, Galaxies, and Cosmology
SCI L240 (1) Principles of Astronomy; Stars, Galaxies, and Cosmology Lab

Required Courses (54 hours)

CJ 3380 (3) Digital Forensics I
CJ 4472 (3) Cyber Crime
CS 2255 (3) Computer Science II
CS 3323 (3) Data Structures
CS 3360 (3) Concepts of Object-Oriented Programming I
CS 3365 (3) Introduction to Computer Organization and Architecture
CS 3333 (3) Introduction to Cryptography
CS 3334 (3) Foundations of Cyber Security
CS 3336 (3) Information Assurance
CS 4452 (3) Cyber Security Policies and Compliance
CS 4453 (3) Ethical Hacking
CS 4454 (3) Secure Software Development
CS 4455 (3) Cyber Security Techniques and Practices
CS 4420 (3) Introduction to Database Systems
CS 4445 (3) Data Communication and Networking
CS 4448 (3) Operating Systems
MTH 2215 (3) Discrete Math

Select one upper level (3000-4000 level) Computer Science elective.

CYBER SECURITY MINOR (18 HOURS)

CJ 3380 (3) Digital Forensics
CJ 4472 (3) Cyber Crime
CS 3360 (3) Concepts of Object-Oriented Programming I
CS 3334 (3) Foundations of Cyber Security
CS 3336 (3) Information Assurance
CS 4452 (3) Cyber Security Policies and Compliance

**DIGITAL FORENSICS MINOR / CERTIFICATE
(18 HOURS)**

Select 18 hours from the following:

CJ 3380	(3)	Digital Forensics I
CJ 3382	(3)	Social Media Investigation
CJ 4472	(3)	Cyber Crime
CJ 4475	(3)	Seminar in Cyber Crime
CJ 4480	(3)	Digital Forensics II
CJ 4481	(3)	Operating and File System Forensics
CJ 4482	(3)	Digital Evidence Practicum

**ELECTRONICS ENGINEERING TECHNOLOGY
PROGRAM (54 HOURS)**

Area III

MTH 1125	(4)	Calculus I
CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab

Area V

TROY 1101	(1)	The University Experience
CS 2250	(3)	Computer Science I
GEM 1100	(2)	Computer-Aided Drafting I

Requirements:

MTH 1126	(4)	Calculus II
PHY 2262	(3)	Physics I w/Calculus
PHY L262	(1)	Physics I w/Calculus Lab
PHY 2263	(3)	Physics II w/Calculus
PHY L263	(1)	Physics II w/Calculus Lab
EET 2220	(3)	Electrical Circuits I
EET L220	(1)	Electrical Circuits I Lab
EET 2221	(3)	Electrical Circuits II
EET L221	(1)	Electrical Circuits II Lab
EET 3311	(3)	Electronic Devices I
EET L311	(1)	Electronic Devices I Lab
EET 3312	(3)	Electronic Devices II
EET L312	(1)	Electronic Devices II Lab
EET 3315	(3)	Digital Logic Circuits
EET L315	(1)	Digital Logic Circuits Lab
EET 4415	(3)	Introduction to Robotics and Automation
EET L415	(1)	Introduction to Robotics and Automation Lab
EET 4420	(3)	Fundamentals of Microcontrollers
EET L420	(1)	Fundamentals of Microcontrollers Lab
EET 4444	(3)	Optical Electronics I
EET L444	(1)	Optical Electronics I CAD Lab
EET 4445	(3)	Optical Electronics II
EET L445	(1)	Optical Electronics II CAD Lab
EET 4480	(3)	Senior Project I Capstone
EET 4481	(3)	Senior Project II Capstone

ENVIRONMENTAL SCIENCE MINOR (18-20 HOURS)

BIO 1120	(3)	Survey of Environmental Sciences
BIO L120	(1)	Survey of Environmental Sciences Lab
BIO 3328	(3)	Environmental Pollution and Control
BIO L328	(1)	Environmental Pollution and Control Lab

Complete 12 hours from the following:

BIO 4479	(3)	Environmental Assessment
BIO L479	(1)	Environmental Assessment Lab
BIO 4420	(4)	Field Vertebrate Zoology (combined lecture and lab)
BIO 4425	(4)	Field Botany or BIO 4402 (combined lecture and lab)
BIO 4476	(1-4)	Special Topics (combined lecture and lab)
BIO 4491	(1-4)	Guided Independent Research (combined lecture and lab)
CHM 3350	(3)	Principles of Physical Chemistry

CHM L350	(1)	Principles of Physical Chemistry Lab
CHM 3352	(3)	Biochemistry
CHM L352	(1)	Biochemistry Lab
CHM 4445	(3)	Instrumental Analysis
CHM L445	(1)	Instrumental Analysis Lab

ENVIRONMENTAL SCIENCE PROGRAM (54-56 HOURS)

***Special Topics in Biology (BIO 4476), Guided Independent Studies (BIO 4491/4492) and Guided Independent Research (BIO 4493, 4494) may only be taken for a maximum of 6 semester hours.**

Specialized General Studies Requirements**Area III**

BIO 1100	(3)	Principles of Biology
BIO L100	(1)	Principles of Biology Lab
CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab

Select one of the following MTH courses:

MTH 1114	(3)	Pre-Calculus Trigonometry
OR		
MTH 1125	(4)	Calculus I

Area V Requirements:

IS 2241	(3)	Computer Concepts and Applications
TROY 1101	(1)	The University Experience
BIO 1101	(3)	Organismal Biology
BIO L101	(1)	Organismal Biology Lab
CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab

Select one of the following GEO or GIS courses:

GEO 2299	(3)	Basic GIS
OR		
GIS 3390	(3)	Fundamentals of Geographical Information and Analysis

Select one PHY lecture and lab combination:

PHY 2252	(3)	General Physics I
PHY L252	(1)	General Physics I Lab
OR		
PHY 2262	(3)	Physics I with Calculus
PHY L262	(1)	Physics I with Calculus Lab

Program Requirements:

BIO 1120	(3)	Survey of Environmental Science
BIO L120	(1)	Survey of Environmental Science Lab
BIO 2220	(3)	Principles of Cell Biology
BIO 2229	(3)	General Ecology
BIO L229	(1)	General Ecology Lab
BIO 3320	(3)	Genetics
BIO 3328	(3)	Environmental Pollution and Control
BIO L328	(1)	Environmental Pollution and Control Lab
BIO 4413	(3)	Limnology
BIO L413	(1)	Limnology Lab
BIO 4479	(3)	Environmental Assessment
BIO L479	(1)	Environmental Assessment Lab
BIO 4484	(1)	Senior Seminar in Biological & Environmental Sciences
CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
STAT 2210	(3)	Introductory Statistics

Complete 20-22 hours of adviser-approved upper-level courses in biology, marine biology, chemistry, geography, or mathematics.

GAME DEVELOPMENT AND DESIGN MINOR (18 HOURS)

Select one of the following:

GDD 2210/HIS 2210	(3)	History Through Games
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GDD 3310/HIS 3310 (3) History of Game Design

Required Courses

GDD 3320 (3) Game Development
 GDD 4499 (3) Game Design Capstone

Select three courses from the following:

GDD 4425 (3) Special Topics in Game Design and Development
 GDD 4490 (3) Internship in Game Design and Development
 ART 2208 (3) Digital Tools
 ART 2210 (3) e-Drawing
 ART 3315 (3) Principles of Digital Design
 MKT 3300 (3) Principles of Marketing
 MKT 3364 (3) Product and Service Innovation
 CS 3360 (3) Concepts of Object Oriented Programming I
 CS 3361 (3) Concepts of Object Oriented Programming II
 ENG 3326 (3) Science Fiction
 ENG 3351 (3) Introduction to Creative Writing
 ENG 3352 (3) Advanced Creative Writing I
 ENG 3353 (3) Advanced Creative Writing II
 ENG 4407 (3) Fantasy Literature

GENERAL EDUCATION A.A. DEGREE (60 HOURS)**Associate of Arts Degree**

See the academic regulations section of this catalog for additional information regarding associate degrees.

Note: Students who pursue a baccalaureate degree with Troy University following the completion of the Associate of Arts in General Education must meet the minimum grade requirements in mathematics.

General Studies Requirements**Area I**

ENG 1101 (3) Composition & Modern English I
 ENG 1102 (3) Composition & Modern English II

Area II**Select one of the following:**

ART 1133 (3) Visual Arts
 THE 1130 (3) Introduction to Theatre
 MUS 1131 (3) Music Appreciation

Select one of the following:

ENG 2205 (3) World Literature before 1660
 ENG 2206 (3) World Literature after 1660
 ENG 2211 (3) American Literature before 1875
 ENG 2212 (3) American Literature after 1875
 ENG 2244 (3) British Literature before 1785
 ENG 2245 (3) British Literature after 1785

Select six hours of one foreign language.

Area III**Select one of the following:**

MTH 1110 (3) Finite Mathematics
 MTH 1112 (3) Pre-calculus Algebra

Select one science course and corresponding lab:

BIO 1100 (3) Principles of Biology
 BIO L100 (1) Principles of Biology Lab
 SCI 2233 (3) Physical Science
 SCI L233 (1) Physical Science Lab
 SCI 2234 (3) Earth and Space Science
 SCI L234 (1) Earth and Space Science Lab

Area IV**Select one of the following:**

HIS 1101 (3) Western Civilization I
 HIS 1102 (3) Western Civilization II
 HIS 1111 (3) U.S. to 1877
 HIS 1112 (3) U.S. since 1877
 HIS 1122 (3) World History to 1500
 HIS 1123 (3) World History from 1500

Area V

IS 2241 (3) Computer Concepts and Applications
 TROY 1101 (1) The University Experience

Additional requirements

Select additional free electives to complete a total of 60 hours.

The completion of 12 or more elective hours within the same discipline area (English, Math, History, etc) will constitute an emphasis area with the Associate's degree. Emphasis areas are not required for the completion of the Associate's degree.

GENERAL EDUCATION A.S. DEGREE (60 HOURS)**Associate of Science Degree**

See the academic regulations section of this catalog for additional information regarding associate degrees.

Note: Students who pursue a baccalaureate degree with Troy University following the completion of the Associate of Science in General Education must meet the minimum grade requirements in mathematics.

General Studies Requirements**Area I**

ENG 1101 (3) Composition & Modern English I
 ENG 1102 (3) Composition & Modern English II

Area II**Select one of the following:**

ART 1133 (3) Visual Arts
 THE 1130 (3) Introduction to Theatre
 MUS 1131 (3) Music Appreciation

Select one of the following:

ENG 2205 (3) World Literature before 1660
 ENG 2206 (3) World Literature after 1660
 ENG 2211 (3) American Literature before 1875
 ENG 2212 (3) American Literature after 1875
 ENG 2244 (3) British Literature before 1785
 ENG 2245 (3) British Literature after 1785

Area III**Select one of the following:**

MTH 1110 (3) Finite Mathematics
 MTH 1112 (3) Pre-calculus Algebra

Select one science course and corresponding lab:

BIO 1100 (3) Principles of Biology
 BIO L100 (1) Principles of Biology Lab
 SCI 2233 (3) Physical Science
 SCI L233 (1) Physical Science Lab
 SCI 2234 (3) Earth and Space Science
 SCI L234 (1) Earth and Space Science Lab

Area IV**Select one of the following:**

HIS 1101 (3) Western Civilization I
 HIS 1102 (3) Western Civilization II
 HIS 1111 (3) U.S. to 1877
 HIS 1112 (3) U.S. since 1877
 HIS 1122 (3) World History to 1500
 HIS 1123 (3) World History from 1500

Area V

IS 2241 (3) Computer Concepts and Applications

TROY 1101 (1) The University Experience

Additional requirements

Select additional free electives to complete a total of 60 hours.

The completion of 12 or more elective hours within the same discipline area (English, Math, History, etc) will constitute an emphasis area with the Associate's degree. Emphasis areas are not required for the completion of the Associate's degree.

**GEOGRAPHIC INFORMATION SCIENCES (GIS)
MAJOR (36 HOURS)**

Specialized General Studies Requirements

Area II

COM 2241 (3) Fundamentals of Speech

Area III

MTH 1114 (3) Pre-Calculus Trigonometry

SCI 2233 (3) Physical Science

SCI L233 (1) Physical Science Lab

Area V

IS 2241 (3) Computer Concepts and Applications

TROY 1101 (1) The University Experience

STAT 2210 (3) Introductory Statistics

BIO 1120 (3) Survey of Environmental Sciences

BIO L120 (1) Survey of Environmental Sciences Lab

CS 3310 (3) Foundations of Computer Sciences

SS 3375 (3) Research Methods in the Social Sciences

Major Requirements

GEO 3300 (3) Principles of Physical Geography

GEO 3301 (3) Principles of Cultural Geography

GIS 3301 (3) Cartography and Geo-Visualization

GIS 3305 (3) Spatial Information and Analysis

GIS 3310 (3) Introduction to Remote Sensing

GIS 3390 (3) Fundamentals of Geographical Information and Analysis

GIS 3391 (3) Application of Geospatial Information Sciences

GIS 4401 (3) Spatial Database Design and Management

GIS 4405 (3) Geospatial Modeling and Programming

GIS 4415 (3) Advanced Geospatial Technologies

GIS 4420 (3) Web-Based GIS/Spatial Data Applications

Select one of the following:

GIS 4490 (3) GIS Senior Project

GIS 4499 (3) GIS Internship

**GEOGRAPHIC INFORMATION SCIENCES (GIS)
MINOR (18 HOURS)**

Required Courses: (9 Hours)

GIS 3301 (3) Cartography and Geo-Visualization

GIS 3305 (3) Spatial Information and Analysis

GIS 3390 (3) Fundamentals of Geographical Information and Analysis

Electives: (9 hours)

Select one course from the following: (3 Hours)

GEO 3300 (3) Principles of Physical Geography

GEO 3301 (3) Principles of Cultural Geography

POL 4402 (3) Political Geography

Select two courses from the following: (6 Hours)

GIS 3310 (3) Introduction to Remote Sensing

GIS 3391 (3) Application of Geospatial Information Sciences

GIS 4401 (3) Spatial Database Design and Management

GIS 4405 (3) Spatial Modeling and Programming

GIS 4415 (3) Advanced Geospatial Technologies

GIS 4420 (3) Web based GIS/Spatial Data Applications

GEM 4410 (3) Introduction to Global Positions

CS 3310 (3) Foundations of Computer Sciences

GEOGRAPHY MINOR (18 HOURS)

GEO 3300 (3) Principles of Physical Geography

GEO 3301 (3) Principles of Cultural Geography

Select an additional 12 hours of approved, upper-level geography courses.

HISTORY EDUCATION (36 HOURS)

Students seeking Alabama teacher certification should select history as a first major and education as a second major. Students should consult with their advisers concerning all certification requirements.

Specialized General Studies Requirements

Area IV

POL 2241 (3) American National Government

SOC 2275 (3) Introduction to Sociology

Select one six-hour sequence:

HIS 1101 (3) Western Civilization I, or placement

HIS 1102 (3) Western Civilization II, or placement

OR

HIS 1122 (3) World History to 1500

HIS 1123 (3) World History from 1500

Area V Requirements

GEO 2210 (3) World Regional Geography

HIS 1111 (3) U.S. to 1877, or placement

HIS 1112 (3) U.S. since 1877, or placement

IS 2241 (3) Computer Concepts and Apps.

TROY 1101 (1) The University Experience

Major Requirements

HIS 3375 (3) Research and Methodology

HIS 4490 (3) Senior Seminar

Select one emphasis:

American/Latin American History Emphasis:

Select 15 hours of upper-level American/Latin American courses in addition to either HIS 3316 or 4406.

Select an additional nine hours of upper-level European/Asian/African courses in addition to HIS 4451.

European/Asian/African History Emphasis:

Select 15 hours of upper-level European/Asian/African courses in addition to HIS 4451.

Select an additional 9 hours of upper-level American/Latin American courses in addition to either HIS 3316 or 4406.

HISTORY MAJOR (36 HOURS)

History Majors/Minors will receive credit for no more than six hours of 3000-level and 4000-level history courses taken before or concurrently with HIS 3375.

Select one emphasis below:

American/Latin American Emphasis:

Specialized General Studies Requirements

Area IV

Select a six hour sequence in Western Civilization or World History. Select additional Area IV courses as specified in the General Studies section of this catalog.

Area V Requirements

GEO 2210 (3) World Regional Geography

HIS 1111 (3) U.S. to 1877, or placement

HIS 1112 (3) U.S. since 1877, or placement

IS 2241 (3) Computer Concepts and Applications

TROY 1101 (1) The University Experience

Requirements for the Major

HIS 3375 (3) Research and Methodology
HIS 4490 (3) Senior Seminar

Select 18 hours of approved upper-level American/Latin American courses.

Select 12 hours of approved upper-level European/Asian/African courses.

European/ Asian/ African Emphasis:

Specialized General Studies Requirements

Area IV

Select a six hour sequence in Western Civilization or World History.

Select six hours of additional Area IV courses as specified in the General Studies section of this catalog.

Area V Requirements

IS 2241 (3) Computer Concepts and Applications
TROY 1101 (1) The University Experience
HIS 1111 (3) U.S. to 1877, or placement
HIS 1112 (3) U.S. since 1877, or placement
GEO 2210 (3) World Regional Geography

Requirements for the Major

HIS 3375 (3) Research and Methodology
HIS 4490 (3) Senior Seminar

Select 18 hours of approved, upper-level European/Asian/African courses

Select 12 hours of approved, upper-level American/Latin American courses.

Accelerated Law Curriculum Option:

Students majoring in History and minoring in Legal Studies may select the Accelerated Law Curriculum Option. See the Accelerated Law Curriculum section the catalog for more information.

9 hours of Law courses will be transferred from the partnered law institution

The following twelve (12) hours from the partnered institution will be transferred into the History Major electives:

Civil Procedure I — 3 credit hours
Civil Procedure II — 3 credit hours
Criminal Law — 3 credit hours
Contracts I — 3-4 credit hours

HISTORY MINOR (18 HOURS)

History Majors/Minors will receive credit for no more than six hours of 3000-level and 4000-level history courses taken before or concurrently with HIS 3375.

HIS 3375 (3) Research and Methodology

Select 15 hours of upper-level history courses.

Note: HIS 1111 and HIS 1112 or permission of instructor are prerequisites for upper-level American/Latin American history courses. HIS 1101 and HIS 1102 or HIS 1122 and 1123 or permission of instructor are prerequisite for upper-level European /Asian/African history courses.

HOMELAND SECURITY MINOR (18 HOURS)

Select 18 hours from the following as approved by the adviser:

CJ 3305 (3) Foundations of Emergency Management
CJ 3335 (3) Security Operations
CJ 4420 (3) Comparative Criminal Justice

CJ 4405 (3) National Security and the Law
CJ 4440 (3) Terrorism
CJ 4470 (3) Criminal Justice Issues in Homeland Security
CJ 4488 (3) Internship (limit one)
POL 3364 (3) State and Local Politics
POL 4415 (3) International Conflict
POL 4422 (3) Public Policy Making

HUMANITIES MINOR (18 HOURS)

Please see the College of Communication and Fine Arts for details on the Humanities Minor.

INTELLIGENCE MINOR (18 HOURS)

Required for the minor:

CJ 3308 (3) Foundations of Intelligence

Select 15 hours from the following courses:

CJ 3305 (3) Foundations of Emergency Management
CJ 3350 (3) Gangs
CJ 3382 (3) Social Media Investigation
CJ 4406 (3) Transnational Organized Crime
CJ 4425 (3) Violence in America
CJ 4430 (3) Selected Topics in Criminal Justice
CJ 4440 (3) Terrorism
CJ 4470 (3) Criminal Justice Issues in Homeland Security
CJ 4498 (3) Criminological Theory

INTER-CULTURAL COMPETENCY MINOR (18 HOURS)

Required Core Courses: (9 hours)

ANT 3310 (3) Cultural Anthropology
POL 2260 (3) World Politics
POL 4460 (3) Intercultural Relations

Select 9 hours from the following:

ANT 3340 (3) Language in Culture and Society
ANT 4411 (3) High Civilizations of the New World
GEO 2210 (3) World Regional Geography
GEO 3301 (3) Principles of Cultural Geography
GEO 3307 (3) Geography of Europe
POL 4450 (3) Latin American Politics
POL 4464 (3) Arab-Israeli Conflict
POL 4465 (3) Politics of the Developing World
POL 4466 (3) Middle Eastern Politics
POL 4467 (3) Asian Politics
POL 4468 (3) Russian Politics
POL 4470 (3) European Politics
POL 4474 (3) Terrorism and Political Violence
POL 4476 (3) Politics of Southeast Asia

INTERDISCIPLINARY MINOR IN EASTERN AND CENTRAL EUROPEAN, RUSSIAN, AND EURASIAN STUDIES (18 HOURS)

Required Courses (6 hours):

RUS 1101 (3) Russian Language I
RUS 1102 (3) Russian Language II

Select four classes (12 hours) from the following electives:

GEO 3307 (3) Geography of Europe
GEO 3326 (3) Geography of the Russian Realm
HIS 4404 (3) Modern Eastern Europe
HIS 4433 (3) Modern Russia
HIS 4469 (3) Europe since World War II
POL 4468 (3) Russian Politics
POL 4470 (3) European Politics

LEGAL STUDIES MINOR (18 HOURS)**Required Courses (9 hours)**

LGL 2200	(3)	Introduction to Legal Studies
LGL 3300	(3)	Legal Research and Writing
LGL 4400	(3)	Seminar in Legal Studies

Select 9 hours of electives from the following courses:

CJ 2241	(3)	Survey of Law and Criminal Procedure
CJ 3352	(3)	Constitutional Law in Criminal Justice
CJ 4447	(3)	Current Issues in Legal Systems Operation and Administration
CJ 4411	(3)	Evidence
LAW 2221	(3)	Legal Environment of Business
LAW 4420	(3)	Administrative Law
LAW 4465	(3)	Selected Topics in Law
POL 3342	(3)	Judicial Branch
POL 4420	(3)	Constitutional Law
POL 4472	(3)	Administrative Law

MARINE BIOLOGY PROGRAM (56 HOURS)

*Special Topics in Biology (BIO 4476), Guided Independent Studies (BIO 4491/4492) and Guided Independent Research (BIO 4493, 4494) may only be taken for a maximum of 6 semester hours.

Students must take courses at both Troy University and Dauphin Island Sea Lab.

Specialized General Studies Requirements**Area III**

BIO 1100	(3)	Principles of Biology
BIO L100	(1)	Principles of Biology Lab
CHM 1142	(3)	General Chemistry I
CHM L142	(1)	General Chemistry I Lab
MTH 1125	(4)	Calculus I

Area V Requirements

IS 2241	(3)	Computer Concepts and Applications
TROY 1101	(1)	The University Experience
BIO 1101	(3)	Organismal Biology
BIO L101	(1)	Organismal Biology Lab
CHM 1143	(3)	General Chemistry II
CHM L143	(1)	General Chemistry II Lab

Complete one sequence (physics sequence not required for medical technology concentration):

PHY 2252	(3)	General Physics I
PHY L252	(1)	General Physics I Lab
PHY 2253	(3)	General Physics II
PHY L253	(1)	General Physics II Lab

OR

PHY 2262	(3)	Physics I with Calculus
PHY L262	(1)	Physics I with Calculus Lab
PHY 2263	(3)	Physics II with Calculus
PHY L263	(1)	Physics II with Calculus Lab

Requirements for the Program

Lectures and corresponding labs must be taken together.

BIO 2220	(3)	Principles of Cell Biology
BIO 2229	(3)	General Ecology
BIO L229	(1)	General Ecology Lab
BIO 3320	(3)	Genetics
BIO 4484	(1)	Senior Seminar in Biological & Environment Sciences
CHM 3342	(3)	Organic Chemistry I
CHM L342	(1)	Organic Chemistry I Lab
CHM 3343	(3)	Organic Chemistry II
CHM L343	(1)	Organic Chemistry II Lab
OR		
CHM 3352	(3)	Biochemistry
CHM L352	(1)	Biochemistry Lab
STAT 2210	(3)	Introductory Statistics

Troy University Courses:

BIO 3307	(3)	Invertebrate Zoology
BIO L307	(1)	Invertebrate Zoology Lab

Complete 14 additional semester hours of adviser-approved biology or marine biology (MB) courses.

Dauphin Island Sea Lab (DISL) Courses (16 semester hours).

DISL courses are offered during the summer term. Students are required to take the following prerequisites before attending DISL: CHM 1143, L143, BIO 1101, L101, BIO 2229, L229. Students must also comply with all DISL catalog prerequisites for individual courses.

Complete 16 semester hours of MB courses approved by the DISL liaison and Department Chair.

MATHEMATICS EDUCATION

Students seeking Alabama teacher certification should select mathematics as a first major and education as a second major. Students should consult with their advisers concerning all certification requirements.

MATHEMATICS MAJOR (38 HOURS)**Specialized General Studies Requirements****Area III**

MTH 1125	(4)	Calculus I
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Area V Requirements

TROY 1101	(1)	The University Experience
STAT 2210	(3)	Introductory Statistics
MTH 2220	(3)	Computer Programming for Mathematics

Requirements for the Major

MTH 1126	(4)	Calculus II
MTH 2227	(4)	Calculus III
MTH 3311	(3)	Differential Equations
MTH 3318	(3)	Introduction to Advanced Mathematics
MTH 3331	(3)	Linear Algebra
MTH 4424	(3)	Real Analysis I
MTH 4441	(3)	Abstract Algebra I

Select one of the following:

MTH 4425	(3)	Real Analysis II
MTH 4442	(3)	Abstract Algebra II

OR both of the following:

STAT 3350	(3)	Statistical Methods and Computation
STAT 4451	(3)	Mathematical Statistics I

Students selecting STAT 3350 and STAT 4451: select nine more hours of mathematics or STAT courses at the 3000 level and above (excluding MTH 4481).

Students selecting MTH 4425 or MTH 4442: select 12 hours of mathematics or STATS courses at the 3000 level and above (excluding MTH 4481).

Students seeking Alabama teacher certification must select MTH 3325, STAT 3350 and STAT 4451.

MATHEMATICS AND PHYSICS DOUBLE MAJOR

Students seeking a double major in Mathematics and Physics should consult with their advisers in both the Mathematics and Physics Departments.

MATHEMATICS MINOR (18 HOURS)

MTH 1125	(4)	Calculus I
MTH 1126	(4)	Calculus II
MTH 2227	(4)	Calculus III
MTH 3331	(3)	Linear Algebra

Select an additional three hours of math or STAT courses at the 3000 level and above, other than those courses whose catalog description declares that they do not count toward the major or

minor.

STATISTICS MINOR (18 HOURS)

Requirements for Minor:

STAT 2210	(3)	Introductory Statistics
STAT 3350	(3)	Statistical Methods and Computations
STAT 4451	(3)	Mathematical Statistics I

Select 9 hours from the following:

STAT 3355	(3)	Survey Sampling
STAT 4452	(3)	Mathematical Statistics II
STAT 4459	(3)	Applied Regression Analysis
STAT 4465	(3)	Categorical Data Analysis
STAT 4466	(3)	Data Mining
STAT 4467	(3)	Experimental Design
STAT 4456	(3)	Mathematics of Finance
STAT 4464	(3)	Multivariate Analysis

MILITARY OPERATIONS MINOR (18 HOURS)

Military electives may be taken from credit recommended by the American Council on Education (ACE) or military credit from regionally accredited institutions. Students transferring in less than 18 credit hours in non-duplicated ACE recommended military credits may take additional advisor approved, upper-level courses as needed. Any excess military credit may go towards a second minor in Military Studies under the Bachelor of Interdisciplinary Studies Program, towards Option II of the BAS-Resource Technology Management Program, or towards the student's free electives requirement if needed.

MILITARY STUDIES MINOR (18 HOURS)

Military electives may be taken from credit recommended by the American Council on Education (ACE) or military credit from regionally accredited institutions. Military Studies minors may only be declared as a second minor within the Bachelor of Interdisciplinary Studies degree program and follow the same guidelines as the Military Operations minor. Any excess military credit may go towards the student's free electives requirement if needed.

**MILITARY SCIENCE LEADERSHIP MINOR
(19-22 HOURS)**

Area II Requirements:

COM 2241	(3)	Fundamentals of Speech
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Area IV Requirements:

Select one 2000 level 3-hour course from one of the following areas: Psychology, Sociology, or Political Science.

MSL 3301	(3)	Leadership and Problem Solving
MSL 3302	(3)	Leadership and Ethics
MSL 3304	(1)	Military Advanced Leadership Lab 111-A
MSL 3305	(1)	Military Advanced Leadership Lab 111-B
MSL 4401	(3)	Leadership and Management
MSL 4402	(3)	Officership
MSL 4404	(1)	Military Advanced Leadership Lab IV-A
MSL 4405	(1)	Military Advanced Leadership Lab IV-B
MSL 4497	(1-3)	Senior Seminar in Military Science

Select a three-hour military history course approved by the professor of military science.

PHILOSOPHY AND RELIGION MINOR (18 HOURS)

Select 9 hours from the following:

PHI 2201	(3)	Introduction to Political Philosophy
PHI 2203	(3)	Introduction to Philosophy
PHI 2204	(3)	Ethics and the Modern World
PHI 2205	(3)	Introduction to Logic
PHI 2210	(3)	Critical Thinking
PHI 2215	(3)	General Topics in Philosophy
PHI 2280	(1-3)	Travel Study in Philosophy
REL 2210	(3)	Introduction to Biblical Studies
REL 2230	(3)	General Topics in Religion

REL 2280	(3)	World Religions
REL 2285	(1-3)	Travel Study in Religion

Select 9 hours from the following upper division courses. At least 6 hours must be philosophy (PHI) courses.

PHI 3301	(3)	Western Philosophy
PHI 3310	(3)	Applied Ethics
PHI 3320	(3)	Non-Western Philosophies
PHI 3322	(3)	Philosophy of Religion
PHI/HIS 3365	(3)	Bioethics in Historical Context
PHI 3380	(3)	Travel Study in Philosophy
PHI 4493-94	(3)	Guided Independent Study
PHI 4495	(3)	Selected Topics in Philosophy
PHI 4499	(1-3)	Internship in Philosophy
REL 3380	(3)	Travel Study in Religion
REL 4499	(1-3)	Internship in Religion
ANT 3340	(3)	Language in Culture and Society
ANT 3360	(3)	Magic, Witchcraft, and Religion
CLA 3311	(3)	Civilization of Greece
HIS 3302	(3)	History of Religion in the United States
HIS 3331	(3)	Western Thought since the 17th Century
HIS 4452	(3)	History of the Medieval Middle East
HIS 4453	(3)	History of the Modern Middle East
HIS 4463	(3)	Europe in the Age of Enlightenment

PHYSICS MAJOR (37 HOURS)

Area III

MTH 1125	(4)	Calculus I
PHY 2262	(3)	Physics I w/Calculus
PHY L262	(1)	Physics I w/Calculus Lab

Area V

CS 2250	(3)	Computer Science I
MTH 1126	(4)	Calculus II*

Note: *Students selecting a minor in Mathematics or a second major in Mathematics will meet the Calculus II requirement in the Mathematics Major/Minor rather than in Area V.

Required courses (20 hours)

PHY 2263	(3)	Physics II w/Calculus
PHY L263	(1)	Physics II w/Calculus Lab
PHY 3310	(3)	Modern Physics
PHY L310	(1)	Modern Physics Lab
PHY 3325	(3)	Thermodynamics
PHY 4420	(3)	Mechanics
PHY 4435	(3)	Electricity & Magnetism
PHY 4445	(3)	Quantum Mechanics I

Select a minimum of 17 semester hours from the courses listed below:

MTH 2227	(4)	Calculus III
MTH 3364	(3)	Vector Calculus
PHY 3320	(3)	Mathematical Methods for Physicists
PHY 3321	(3)	Scientific Computing
PHY 3359	(3)	Waves and Optics
PHY L359	(1)	Waves and Optics Lab
PHY 4438	(3)	Electromagnetic Fields
PHY 4440	(3)	Dynamics of Particles & Systems
PHY 4446	(3)	Quantum Mechanics II
PHY 4460	(3)	Relativity I
PHY 4470	(3)	Nuclear Physics
PHY 4475	(3)	Particle Physics
PHY 4478	(3)	Relativity II
PHY 4482	(3)	Introduction to String Theory
PHY 4483-85	(1)	Seminar in Relativity
PHY 4495	(3)	Topics in Physics

- PHY 4491-92 (3) Guided Independent Research
 PHY 4493-94 (3) Guided Independent Study

PHYSICS AND MATHEMATICS DOUBLE MAJOR

Students seeking a double major in Physics and Mathematics should consult with their advisers in both the Physics and Mathematics Departments.

PHYSICS MINOR (18-19 HOURS)

- PHY 2262 (3) Physics I Calculus
 PHY L262 (1) Physics I with Calculus Lab
 PHY 2263 (3) Physics II with Calculus
 PHY L263 (1) Physics II with Calculus Lab
 PHY 3310 (3) Modern Physics
 PHY L310 (1) Modern Physics Lab

Select an additional six to seven hours of adviser-approved, upper-level physics courses.

POLITICAL SCIENCE MAJOR (36 HOURS)

Area V Requirements

- IS 2241 (3) Computer Concepts and Applications
 TROY 1101 (1) The University Experience
 POL 2241 (3) American National Government or placement in POL 2240
 POL 2260 (3) World Politics

Major Requirements

- POL 3300 (3) Foundations of Political Science
 POL 3330 (3) Political Theory
 POL 3390 (3) The Art of Political Science Research

Select one of the following concentrations:

American Politics and Public Administration Concentration

- POL 3340 (3) U. S. Government—Executive Branch
 POL 3341 (3) U. S. Government—Legislative Branch
 POL 3342 (3) U. S. Government—Judicial Branch

Select six hours from the following:

- POL 3343 (3) American Political Processes
 POL 3355 (3) Southern Politics
 POL 3364 (3) State and Local Politics
 POL 3338 (3) Women in Politics
 POL 3339 (3) African-American Politics
 POL 4405 (3) Political Behavior and Public Opinion
 POL 4420 (3) Constitutional Law
 POL 4421 (3) Introduction to Public Administration
 POL 4422 (3) Public Policy Making
 POL 4424 (3) Contemporary American Foreign Policy
 POL 4432 (3) Comparative Public Policy
 POL 4451 (3) Public Personnel Administration
 POL 4453 (3) Bureaucratic Politics
 POL 4469 (3) Religion in Politics
 POL 4472 (3) Administrative Law

Select an additional 12 hours of upper-level (3000-4000) political science courses, as approved by your academic adviser.

International Politics Concentration:

- POL 3351 (3) International Relations
 POL 4410 (3) International Political Economy
 POL 4433 (3) Comparative Government

Select six hours from the following:

- POL 4405 (3) Political Behavior and Public Opinion
 POL 4415 (3) International Conflict
 POL 4424 (3) Contemporary American Foreign Policy
 POL 4432 (3) Comparative Public Policy
 POL 4445 (3) Inter-American Relations
 POL 4450 (3) Latin American Politics
 POL 4452 (3) International Law
 POL 4460 (3) Intercultural Relations

- POL 4464 (3) Arab-Israeli Conflict
 POL 4465 (3) Politics of the Developing World
 POL 4466 (3) Middle Eastern Politics
 POL 4467 (3) Asian Politics
 POL 4468 (3) Russian Politics
 POL 4470 (3) European Politics
 POL 4474 (3) Terrorism and Political Violence
 POL 4476 (3) Politics of Southeast Asia

Select an additional 12 hours of upper-level (3000-4000) political science courses, as approved by your academic adviser.

Accelerated Law Curriculum Option:

Students majoring in Political Science and Legal Studies as a minor may select the Accelerated Law Curriculum Option. See the Accelerated Law Curriculum section the catalog for more information.

15 hours of Law courses will be transferred from the partnered law institution

The following six (6) hours from the partnered institution will be transferred into the Political Science Major electives:

- Civil Procedure I — 3 credit hours
 Civil Procedure II — 3 credit hours

POLITICAL SCIENCE MINOR (18 HOURS)

- POL 3300 (3) Foundations of Political Science
 POL 3330 (3) Introduction to Political Theory

Select an additional 12 hours of upper level courses, as approved by your academic adviser.

AMERICAN POLITICS MINOR (18 HOURS)

Required Courses (9 hours)

- POL 3340 (3) U. S. Government—Executive Branch
 POL 3341 (3) U. S. Government—Legislative Branch
 POL 3342 (3) U. S. Government—Judicial Branch

Select three of the following courses (9 hours)

- POL 3343 (3) American Political Processes
 POL 3355 (3) Southern Politics
 POL 3364 (3) State and Local Politics
 POL 3338 (3) Women in Politics
 POL 3339 (3) African-American Politics
 POL 4405 (3) Political Behavior and Public Opinion
 POL 4420 (3) Constitutional Law
 POL 4421 (3) Introduction to Public Administration
 POL 4422 (3) Public Policy Making
 POL 4424 (3) Contemporary American Foreign Policy
 POL 4432 (3) Comparative Public Policy
 POL 4451 (3) Public Personnel Administration
 POL 4453 (3) Bureaucratic Politics
 POL 4469 (3) Religion in Politics
 POL 4472 (3) Administrative Law

INTERNATIONAL RELATIONS MINOR (18 HOURS)

Required course (9 hours)

- POL 3351 (3) International Relations
 POL 4410 (3) International Political Economy
 POL 4433 (3) Comparative Government

Select three hours from the following courses (9 hours)

- POL 3300 (3) Foundations of Political Science
 POL 4405 (3) Political Behavior and Public Opinion
 POL 4415 (3) International Conflict
 POL 4424 (3) Contemporary American Foreign Policy
 POL 4432 (3) Comparative Public Policy
 POL 4445 (3) Inter-American Relations
 POL 4450 (3) Latin American Politics
 POL 4452 (3) International Law

POL 4460	(3)	Intercultural Relations
POL 4464	(3)	Arab-Israeli Conflict
POL 4465	(3)	Politics of the Developing World
POL 4466	(3)	Middle Eastern Politics
POL 4467	(3)	Asian Politics
POL 4468	(3)	Russian Politics
POL 4470	(3)	European Politics
POL 4474	(3)	Terrorism and Political Violence
POL 4476	(3)	Politics of Southeast Asia

SCIENCE EDUCATION

Students seeking Alabama teacher certification should select the comprehensive science program as a first major and education as a second major. Students should consult with their advisers concerning all certification requirements.

SOCIAL SCIENCE EDUCATION

Students seeking Alabama teacher certification should complete the social science major with a general social science concentration and select education as a second major. Students should consult their education advisers concerning all certification requirements and with their academic discipline adviser for requirements in the major. **Education students will need to take coursework to include the following disciplines: Geography, History, Political Science, and Economics.*

SOCIAL SCIENCE MAJOR (36 HOURS)

Specialized General Studies Requirements

Area IV

NOTE: Social Science Education Majors must take HIS 1101 Western Civilization I and HIS 1102 Western Civilization II.

Area V Requirements

STAT 2210 (3) Introductory Statistic

Requirements for the Major

SS 2220	(3)	Introduction to Social Science
SS 3375	(3)	Research Methods in the Social Sciences
SS 3376	(3)	Statistical Applications of Social Science Inquiry
GIS 3390	(3)	Fundamentals of Geographical Information and Analysis
SS 4498	(3)	Social Science Theory
SS 4499	(3)	Senior Seminar

Select an additional 18 hours of approved upper-level courses in at least three disciplines from the following: *anthropology, economics, geography, history, political science, psychology, sociology, criminal justice, or as approved by the department chair*

Accelerated Law Curriculum Option:

Students majoring in Social Science and Legal Studies as a minor may select the Accelerated Law Curriculum Option. See the Accelerated Law Curriculum section the catalog for more information.

15 hours of Law courses will be transferred from the partnered law institution

The following six (6) hours from the partnered institution will be transferred into the Social Science Major electives:

Civil Procedure I — 3 credit hours
Civil Procedure II — 3 credit hours

SOCIAL SCIENCE MINOR: GENERAL SOCIAL SCIENCE (18 HOURS)

SS 2220 (3) Introduction to Social Science

Select an additional 15 hours from at least three of the following:

anthropology, criminal justice, economics, geography, history, political science, psychology, social science, or sociology. At least 12 hours must be 3000/4000 level.

SOCIOLOGY MAJOR (36 HOURS)

Area IV Requirements

SOC 2275 (3) Introduction to Sociology

Area V Requirements

IS 2241 (3) Computer Concepts and Applications
TROY 1101 (1) The University Experience
STAT 2210 (3) Introductory Statistics

Requirements for the Major

SOC 4420 (3) Sociological Theory
SS 3375 (3) Research Methods in the Social Sciences
SS 3376 (3) Statistical Applications of Social Science Inquiry
SS 4499 (3) Senior Seminar

Select an additional 24 hours of approved upper-level sociology courses.

Accelerated Law Curriculum Option:

Students majoring in History and Legal Studies as a minor may select the Accelerated Law Curriculum Option. See the Accelerated Law Curriculum section the catalog for more information.

15 hours of Law courses will be transferred from the partnered law institution

The following six (6) hours from the partnered institution will be transferred into the Sociology Major electives:

Civil Procedure I — 3 credit hours
Civil Procedure II — 3 credit hours

SOCIOLOGY MINOR (18 HOURS)

SOC 2275 (3) Introduction to Sociology

Select 18 hours of approved, upper-level Sociology courses. SOC 2280 may be applied toward the minor.

SURVEYING AND GEOMATICS SCIENCES PROGRAM (53 HOURS)

Area II:

ART 2201 (3) Introductory Drawing

Select remaining Area II courses as specified in the General Studies section of this catalog.

Area III Requirements

MTH 1125 (4) Calculus I

Select an 8 hour physics sequence with labs:

PHY 2252 (3) General Physics I
PHY L252 (1) General Physics I Laboratory
PHY 2253 (3) General Physics II
PHY L253 (1) General Physics II Laboratory

OR

PHY 2262 (3) Physics I with Calculus
PHY L262 (1) Physics I with Calculus Laboratory
PHY 2263 (3) Physics II with Calculus
PHY L263 (1) Physics II with Calculus Laboratory

Area V Requirements

CS 2250 (3) Computer Science I
IS 2241 (3) Computer Concepts & Application
MTH 2230 (3) Applied Linear Algebra
STAT 2210 (3) Introductory Statistics
TROY 1101 (1) The University Experience

Program Requirements

GEM 1100	(2)	Computer-Aided Drafting I
GEM 1101	(2)	Computer-Aided Drafting II
GEM 2220	(3)	Basics of Surveying
GEM L220	(1)	Basics of Surveying Lab
GEM 3309	(3)	Land Survey Principles
GEM L309	(1)	Land Survey Principles Lab
GEM 3310	(3)	Land Survey Practice
GEM L310	(1)	Land Survey Practice Lab
GEM 3330	(3)	Advanced Measurement Analysis
GEM L330	(1)	Advanced Measurement Analysis Lab
GEM 3366	(3)	Photogrammetry and Remote Sensing
GEM 3379	(3)	Introduction to Least Squares Adjustment
GIS 3390	(3)	Fundamentals of Geographic Information and Analysis
GIS 3391	(3)	Application of Geospatial Information Sciences
GEM 4405	(3)	Route & Construction Surveying
GEM L405	(1)	Route & Construction Surveying Lab
GEM 4407	(3)	Land Development
GEM L407	(1)	Land Development Lab
GEM 4408	(3)	Geodesy & Geodetics
GEM 4409	(3)	Hydrology
GEM L409	(1)	Hydrology Lab
GEM 4410	(3)	Introduction to Global Positions
GEM 4490	(1)	Geomatics Capstone

Select two hours below:

GEM 4499 (2) Geomatics/GIS Projects

OR

GEM 3395 (1) Cooperative Work Experience I and

GEM 4496 (1) Cooperative Work Experience II

**SURVEYING AND GEOMATICS SCIENCES MINOR
(20 HOURS)**

Required Courses:

GEM 1100	(2)	Computer-Aided Drafting
GEM 2220	(3)	Basics of Surveying
GEM 3309	(3)	Land Surveying Principles
GIS 3390	(3)	Fundamentals of Geographic Information and Analysis
GEM 4408	(3)	Geodesy and Geodetics
GEM 4409	(3)	Hydrology
GEM 4410	(3)	Introduction to Global Positions (GPS)

UNMANNED AERIAL SYSTEMS MINOR (18 HOURS)

Required Courses:

UAS 2200	(3)	Unmanned Aerial Systems Overview
UAS 2202	(3)	Principles of UAS Design
UAS 2204	(3)	Principles of UAS Sensors & Sensing Systems
UAS 2206	(3)	Human Factors In UAS Operations & Accidents
UAS 2208	(3)	Legal & Ethical Considerations for UAS Operations

Select 3 semester hours from the following:

UAS 2210	(3)	UAS Real World Applications
UAS 2212	(3)	UAS Piloting Familiarization

