SCIENCE, MATHEMATICS, AND TECHNOLOGY: A.A., A.S.

Students of Science, Mathematics and Technology will explore the natural sciences (physics, chemistry and biology), mathematics, computer science and a range of technological, applied-science and health-related fields. Students will study the fundamental laws and concepts of their concentration, develop their knowledge of scientific methodology and learn the skills important for successful practice and communication, whether they are entering a new field or honing skills in their current occupation. Students will sharpen skills in critical reading and thinking, as, together with a faculty mentor, create a program to meet your specific needs and goals.

Degree programs in Science, Mathematics and Technology offer students the opportunity to develop individualized degree plans based on their intellectual, professional, and personal interests. General program guidelines can be found on the "Program Details" tab, and students will work with an academic mentor to choose courses that meet the guidelines and address each student's individual interests. Students can also work with their academic mentors to identify applicable transfer credit, prior college-level learning, and possible course equivalencies. Working with a mentor and using Empire State University's educational planning process, students can develop a specialized concentration in Science, Mathematics and Technology by following the general program guidelines as well as any applicable concentration guidelines. Students may also develop their own concentrations.

For more information about general undergraduate degree requirements, please visit Earning an Undergraduate Degree (http://catalog.esc.edu/undergraduate/earning-undergraduate-degree/).

For sample degree programs and other degree planning resources, please visit the Department of Computer Science and Technology (https://www.esc.edu/computer-science-tech/degree-planning-resources/), Mathematics (https://www.esc.edu/mathematics/degree-planning-resources/), or Natural Sciences (https://www.esc.edu/natural-sciences/degree-planning-resources/) Degree Planning Resources web page.

Please note:

- Empire State University does not offer degrees in engineering. You may study the mathematics and the theoretical sciences that comprise the traditional engineering curriculum, but the title of the degree cannot contain the word "engineering"
- In the sciences there are many opportunities for experimentation, research, and analytical work. These include virtual labs, courses with lab kits, field experience courses and residencies. Students can also engage in scientific internships and pursue college credit for prior learning in their fields. Students should be aware that they may need specific laboratory and/or field courses to meet entrance requirements for graduate studies; they should confirm such requirements with these institutions

Taking individual courses as a nondegree nonmatriculated student also is possible and will offer you the same range and depth of courses and rigorous standards as matriculated undergraduate students.

These area of study guidelines address the broad needs of students interested in pursuing degrees in Science, Mathematics, and Technology.

Degree programs at the associate level must address these five program outcomes, minimally at the introductory level. Foundational knowledge in their field prepares students for progression to the bachelor's degree.

Students should refer to the university's concentration guidelines for program outcomes specific to their fields. Otherwise, students must research their field and describe academic and professional expectations for their concentration in their rationale essay.

Knowledge in science, mathematics, and technology is continually evolving. Thus, degree programs should demonstrate currency in their fields. In addition, students are expected to develop life-long learning skills and engage in ongoing inquiry to acquire new knowledge and maintain currency.

Students earning degrees in Science, Mathematics, and Technology will achieve the following program outcomes:

Foundation #1: Breadth and Depth of Knowledge

Code	Title	Credits
BIOL 1000	Survey of Biology	4
BIOL 1002	Human Biology	4
BIOL 1004	Human Nutrition	4
BIOL 1006	Genomics & You	4
or BIOL 1210	Biology I: Lecture	
BIOL 1200	Biology I with Lab	4
or BIOL 1212	Biology II: Lecture	
BIOL 1201	Biology II with Lab	4
BIOL 1204	Introduction to Cell Biology & Genetics	4
BIOL 1205	Introduction to Organismal Biology	4
BIOL 1206	Introduction to Population Biology	4
or BIOL 1310	Anatomy and Physiology I: Lecture	
BIOL 1304	Anatomy & Physiology I with Lab	4
or BIOL 1312	Anatomy & Physiology II: Lecture	
BIOL 1305	Anatomy & Physiology II with Lab	4
BIOL 1400	Evolution & Ecology	4
BIOL 1402	Introduction to Biological Anthropology	4
BIOL 1404	Wildlife Conservation	4
CHEM 1002	Chemistry in Context	4
or CHEM 1210	Chemistry I: Lecture	
CHEM 1205	Chemistry I with Lab	4
or CHEM 1210	Chemistry I: Lecture	
CHEM 1206	Chemistry II with Lab	4
or CHEM 1212	Chemistry II: Lecture	
CHEM 3210	Organic Chemistry I with Lab	4
or CHEM 3220	Organic Chemistry I	
CSCI 1010	Introduction to Computers	4
CSCI 1020	Introduction to Networks	4
CSCI 3000	Computer Operations & Security	4
CSCI 4000	Advanced Computing Models: Virtualization Cloud & Mobile Computing	4
CSCI 4005	Software Engineering	4
CSCI 4015	Theory of Computation	4
ENSC 1000	Earth Science	4
ENSC 1002	Energy: The Issues & the Science	4
ENSC 1004	Global Climate Change	4

ENSC 1006	Introduction to Ecology & Sustainability	4
ENSC 1200	Environmental Science	4
ENSC 2000	Principles of Environmental Sustainability	4
GEOL 1200	Introduction to Geology	4
GEOL 2200	Historical Geology with Lab	4
GSCI 1000	Integrated Sciences	4
GSCI 1004	Introduction to Forensic Science	4
GSCI 1006	The Science of Cooking	4
GSCI 1020	Physical Science	4
GSCI 1500	Science Colloquium	4
HSCI 1010	Introduction to Epidemiology	4
HSCI 1200	Medical Terminology	4
INFS 2000	Exploring the Disciplines: Information Systems: Introductory	2
INFS 3010	Database Systems	4
INFT 2020	Introduction to Digital Crime & Digital Terrorism	4
INFT 3010	Advanced Digital Crime & Digital Terrorism	4
INFT 3040	Social Media Management	4
INFT 3050	Systems Analysis & Design	4
INFT 4005	Business Continuity Planning & Disaster Recovery	4
INFT 4015	Information Assurance	4
MATH 1040	Algebra	4
MATH 1140	Precalculus	4
MATH 2015	Mathematics for Game Programmers	4
MATH 2140	Calculus I	4
MATH 2141	Calculus II	4
MATH 3005	History of Mathematics: Advanced	4
MATH 3010	Linear Algebra	4
MATH 3015	Discrete Mathematics	4
MATH 3025	Math Modeling	4
MATH 3040	Calculus III	4
MATH 3045	Mathematical Proofs	4
MATH 3065	Ordinary Differential Equations	4
MATH 4005	Number Theory	4
MATH 4010	Abstract Algebra I: Group Theory	4
MATH 4025	Complex Variables	4
MGIS 4005	Information Security & Policy	4
PHYS 1000	Conceptual Physics	4
PHYS 1100	Introductory Astronomy	4
or PHYS 1210	Physics I: Lecture	
PHYS 1200	Physics I with Lab	4
or PHYS 1212	Physics II: Lecture	
PHYS 1201	Physics II with Lab	4

Foundation #2: Problem Solving and Critical Thinking

Code	Title	Credits
BIOL 1402	Introduction to Biological Anthropology	4
BIOL 1404	Wildlife Conservation	4
BIOL 2002	Populations & Diseases	4
BIOL 2004	Bioterrorism	2
BIOL 2208	Animal Behavior	4
or BIOL 2210	Inside the Animal Mind: Insights into Animal Behavior Ecology & Evolution	

BIOL 2200	Microbiology with Lab	4
or BIOL 2220	Microbiology: Lecture	
BIOL 2201	Tropical Ecology	4
BIOL 2204	Ethnobotany	4
BIOL 3200	The Biology of Being Human	4
BIOL 3204	Genetics	4
BIOL 3206	Cell Biology	4
BIOL 3208	Molecular Biology	4
BIOL 3210	Biology of Microorganisms	4
BIOL 3212	Biology of the Brain	4
BIOL 3214	Human Physiology	4
BIOL 3302	Evolution	4
BIOL 3304	Conservation Biology	4
BIOL 3306	Ecology	4
BIOL 3308	Plant Ecology	4
BIOL 3310	Tropical Ecology	4
BIOL 3400	Marine Biology	4
BIOL 3404	Primate Behavioral Ecology	4
BIOL 3408	Advanced Biological Anthropology	4
BIOL 3502	Cellular and Molecular Neuroscience	4
BIOL 3602	Phytochemistry	4
BIOL 3604	Plant Physiology	4
BIOL 4102	Diseases of the Brain	4
BIOL 4206	Immunology	4
BIOL 4310	Aquatic Biology & Ecology	4
BIOL 4300	Herpetology	4
BIOL 4302	Animal Learning	4
BIOL 4304	Ornithology	4
BIOL 4306	Mammalogy	4
BIOL 4308	Marine Mammalogy	4
BIOL 4400	Principles of Pharmacology	4
BIOL 4408	Molecular Biotechnology	4
BIOL 4410	Plant Biotechnology	4
CHEM 3210	Organic Chemistry I with Lab	4
or CHEM 3220	Organic Chemistry I	
CHEM 3221	Organic Chemistry II	4
CHEM 3300	Physical Chemistry I	4
CHEM 3302	Physical Chemistry II	4
CHEM 3400	Biochemistry	4
CHEM 4200	Inorganic Chemistry I	4
CHEM 4201	Inorganic Chemistry II	4
CHEM 4300	Environmental Chemistry I	4
CHEM 4301	Environmental Chemistry II	4
CHEM 4400	Biochemistry I	4
CHEM 4401	Biochemistry II	4
CSCI 1015	Introduction to Database Design	4
CSCI 1020	Introduction to Networks	4
CSCI 1025	Introduction to Programming: Visual Basic	4
CSCI 2010	Introduction to C++ & OOP	4
CSCI 2015	Introduction to Object-Oriented Programming: Java	4
CSCI 3000	Computer Operations & Security	4

CSCI 3005	Computer Organization & Architecture	4
CSCI 4000	Advanced Computing Models: Virtualization Cloud & Mobile Computing	4
ENSC 3000	Meteorology	4
ENSC 3002	Global Climates	4
ENSC 3004	Dendrology	2
ENSC 3006	Natural Disasters	4
ENSC 3008	National Parks of the US: Geology Ecology & History	4
ENSC 3200	Urban Ecology	4
ENSC 3202	Forest Ecology	4
ENSC 3300	Soil Science	4
ENSC 4202	Biogeography	4
ENSC 4600	Ecology & Earth Systems Field Research	4
ENSC 4800	Environmental Science Capstone	4
GEOL 3200	Geomorphology	4
GEOL 3202	Hydrology	4
INFS 1000	Computer Applications	4
INFS 1002	Computer Applications for Data Processing	2
INFS 2010	Introduction to Data Management Tools	4
INFT 2020	Introduction to Digital Crime & Digital Terrorism	4
INFT 3005	Data Analytics	4
INFT 3010	Advanced Digital Crime & Digital Terrorism	4
INFT 3015	Communications Technology Convergence	4
INFT 3025	Data Communications & Networks	4
INFT 3040	Social Media Management	4
INFT 3045	Social, Professional & Ethical Issues in Computing	4
INFT 3055	Technology for Digital Marketing	4
INFT 3065	Web Systems Development	4
INFT 4020	Technology in Mathematics Education	4
MATH 1000	College Mathematics	4
MATH 1005	Contemporary Mathematics	4
MATH 1025	Quantitative Reasoning	4
MATH 1040	Algebra	3,4
MATH 1050	Mathematics for Business	4
MATH 1065	Statistics	4
MATH 1100	Introduction to Discrete Mathematics	4
MATH 1110	Geometry	4
MATH 1150	Calculus for Business	4
MATH 2005	History of Mathematics: Introductory	4
MATH 2010	Introduction to Proof & Logic	4
MATH 2015	Mathematics for Game Programmers	4
MATH 3010	Linear Algebra	4
MATH 3015	Discrete Mathematics	4
MATH 3045	Mathematical Proofs	4
MATH 4005	Number Theory	4
MATH 4025	Complex Variables	4
MATH 4030	Real Analysis	4
MGIS 2000	The Internet of Things (IoT) Essentials	4
MGIS 3000	Business Intelligence: Practices, Technologies, Management	4
MGIS 3005	The Business of the Internet of Things (IoT)	4
MGIS 3010/ BUSN 3122	Management Information Systems	4
MGIS 4015	Project Management in IT / IS	4
MGIS 4020	IT Strategy and Innovations	4

Foundation #3: Methodological, Quantitative, and Digital Expertise

Code	Title	Credits
BIOL 2201	Tropical Ecology	4
BIOL 2208	Animal Behavior	4
or BIOL 2220	Microbiology: Lecture	
BIOL 2400	Plant Biology	4
BIOL 3200	The Biology of Being Human	4
BIOL 3204	Genetics	4
BIOL 3206	Cell Biology	4
BIOL 3208	Molecular Biology	4
BIOL 3210	Biology of Microorganisms	4
BIOL 3212	Biology of the Brain	4
BIOL 3214	Human Physiology	4
BIOL 3302	Evolution	4
BIOL 3304	Conservation Biology	4
BIOL 3306	Ecology	4
BIOL 3308	Plant Ecology	4
BIOL 3310	Tropical Ecology	4
BIOL 3400	Marine Biology	4
BIOL 3404	Primate Behavioral Ecology	4
BIOL 3408	Advanced Biological Anthropology	4
BIOL 3502	Cellular and Molecular Neuroscience	4
BIOL 3602	Phytochemistry	4
BIOL 3604	Plant Physiology	4
BIOL 4102	Diseases of the Brain	4
BIOL 4206	Immunology	4
BIOL 4300	Herpetology	4
BIOL 4302	Animal Learning	4
BIOL 4304	Ornithology	4
BIOL 4306	Mammalogy	4
BIOL 4308	Marine Mammalogy	4
BIOL 4400	Principles of Pharmacology	4
BIOL 4408	Molecular Biotechnology	4
BIOL 4410	Plant Biotechnology	4
CHEM 3210	Organic Chemistry I with Lab	4
or CHEM 3220	Organic Chemistry I	
CHEM 3221	Organic Chemistry II	4
CHEM 3400	Biochemistry	4
CHEM 3300	Physical Chemistry I	4
CHEM 3302	Physical Chemistry II	4
CHEM 4200	Inorganic Chemistry I	4
CHEM 4201	Inorganic Chemistry II	4
CHEM 4300	Environmental Chemistry I	4
CHEM 4301	Environmental Chemistry II	4
CHEM 4400	Biochemistry I	4
CHEM 4401	Biochemistry II	4
CSCI 1015	Introduction to Database Design	4
CSCI 1025	Introduction to Programming: Visual Basic	4

CSCI 2010	Introduction to C++ & OOP	4
CSCI 2015	Introduction to Object-Oriented Programming: Java	4
CSCI 3005	Computer Organization & Architecture	4
CSCI 4005	Software Engineering	4
CSCI 4015	Theory of Computation	4
ENSC 3000	Meteorology	4
ENSC 3002	Global Climates	4
ENSC 3004	Dendrology	2
ENSC 3006	Natural Disasters	4
ENSC 3008	National Parks of the US: Geology Ecology & History	4
ENSC 3200	Urban Ecology	4
ENSC 3202	Forest Ecology	4
ENSC 3300	Soil Science	4
ENSC 4202	Biogeography	4
ENSC 4600	Ecology & Earth Systems Field Research	4
ENSC 4800	Environmental Science Capstone	4
GEOL 3200	Geomorphology	4
GEOL 3202	Hydrology	4
GSCI 2200	GPS & The New Geography	4
GSCI 3200	Geographic Information Systems	4
GSCI 4200	Materials Science	4
HSCI 3200	Health Informatics	4
HSCI 4200	Epidemiology	4
INFS 1000	Computer Applications	4
INFS 2010	Introduction to Data Management Tools	4
INFS 3010	Database Systems	4
INFT 1005	Introduction to Web Publishing	4
INFT 2010	Introduction to Web Publishing with Adobe Dreamweaver Creative Cloud	4
INFT 3005	Data Analytics	4
INFT 3015	Communications Technology Convergence	4
INFT 3020	Cyber Crime & Computer Forensics	4
INFT 3025	Data Communications & Networks	4
INFT 3030	Human-Computer Interaction	4
INFT 3035	Project Management	4
INFT 3050	Systems Analysis & Design	4
INFT 3055	Technology for Digital Marketing	4
INFT 3065	Web Systems Development	4
INFT 4005	Business Continuity Planning & Disaster Recovery	4
INFT 4015	Information Assurance	4
INFT 4020	Technology in Mathematics Education	4
MATH 1000	College Mathematics	4
MATH 1005	Contemporary Mathematics	4
MATH 1025	Quantitative Reasoning	4
MATH 1050	Mathematics for Business	4
MATH 1055	Mathematics for Elementary Teachers	4
MATH 1065	Statistics	4
MATH 1100	Introduction to Discrete Mathematics	4
MATH 1110	Geometry	4
MATH 1150	Calculus for Business	4
MATH 2140	Calculus I	4

MATH 2141	Calculus II	4
MATH 3010	Linear Algebra	4
MATH 3025	Math Modeling	4
MATH 3040	Calculus III	4
MATH 3065	Ordinary Differential Equations	4
MATH 4005	Number Theory	4
MATH 4025	Complex Variables	4
MGIS 3000	Business Intelligence: Practices, Technologies, Management	4
MGIS 3005	The Business of the Internet of Things (IoT)	4
MGIS 3010/ BUSN 3122	Management Information Systems	4
MGIS 4005	Information Security & Policy	4
MGIS 4015	Project Management in IT / IS	4
MGIS 4020	IT Strategy and Innovations	4

Foundation #4: Communication

Code	Title	Credits
BIOL 2208	Animal Behavior	4
or BIOL 2210	Inside the Animal Mind: Insights into Animal Behavior Ecology & Evolution	
BIOL 2400	Plant Biology	4
BIOL 3502	Cellular and Molecular Neuroscience	4
BIOL 3604	Plant Physiology	4
BIOL 4102	Diseases of the Brain	4
BIOL 4302	Animal Learning	4
BIOL 4400	Principles of Pharmacology	4
ENSC 1000	Earth Science	4
ENSC 4600	Ecology & Earth Systems Field Research	4
ENSC 4800	Environmental Science Capstone	4
GEOL 3202	Hydrology	4
GSCI 1500	Science Colloquium	4
INFT 3000	Academic Planning / Technology and Society	4
MATH 1140	Precalculus	4
MATH 2005	History of Mathematics: Introductory	4
MATH 2010	Introduction to Proof & Logic	4
MATH 3005	History of Mathematics: Advanced	4
MATH 3045	Mathematical Proofs	4
MATH 4010	Abstract Algebra I: Group Theory	4
MATH 4030	Real Analysis	4

Foundation #5: Social Responsibility

Code	Title	Credits
BIOL 1404	Wildlife Conservation	4
BIOL 2000	Bioethics in Modern Medicine	4
BIOL 2002	Populations & Diseases	4
BIOL 2004	Bioterrorism	2
BIOL 2204	Ethnobotany	4
BIOL 3304	Conservation Biology	4
BIOL 3306	Ecology	4
BIOL 4700	Contemporary Topics in Biology	4
ENSC 1002	Energy: The Issues & the Science	4
ENSC 1004	Global Climate Change	4
ENSC 1006	Introduction to Ecology & Sustainability	4

ENSC 2000	Principles of Environmental Sustainability	4
ENSC 3006	Natural Disasters	4
ENSC 3008	National Parks of the US: Geology Ecology & History	4
ENSC 3304	Environmental Health	4
ENSC 3200	Urban Ecology	4
ENSC 3302	Sustainable Living: Food & Energy	4
ENSC 4200	Contemporary Environmental Issues	4
ENST 3005	Community Supported Agriculture	4
ENST 3010	Sustainability & Agriculture	4
ENST 3015	Iroquois Cultural Botany	4
HSCI 1010	Introduction to Epidemiology	4
HSCI 4200	Epidemiology	4
INFT 2005	Green Computing	4
INFT 3000	Academic Planning / Technology and Society	4
INFT 3045	Social, Professional & Ethical Issues in Computing	3,4
MATH 2005	History of Mathematics: Introductory	4
MATH 3005	History of Mathematics: Advanced	4

- Foundation 1: Breadth and Depth of Knowledge, Students will be able to demonstrate a conceptual understanding of their field by articulating foundational knowledge, including key concepts, methodologies, and theories.
- Foundation 1: Breadth and Depth of Knowledge, Students will be able to demonstrate a conceptual understanding of their field by explaining how their program includes breadth of knowledge in their subject area.
- Foundation 2: Problem Solving and Critical Thinking, Students will be able to demonstrate skills to analyze and solve unique situations and problems by designing, implementing, and evaluating strategies for answering open-ended questions for which solutions are not immediately evident.
- Foundation 2: Problem Solving and Critical Thinking, Students will be able to demonstrate skills to analyze and solve unique situations and problems by thinking critically and objectively about problems and identifying the best solutions.
- Foundation 3: Methodological, Quantitative, and Digital Expertise, Students will be able to demonstrate a working knowledge of investigative, quantitative, and technological approaches and skills to engage in their fields by applying the quantitative and technical skills necessary to engage in their fields.
- Foundation 3: Methodological, Quantitative, and Digital Expertise, Students will be able to demonstrate a working knowledge of investigative, quantitative, and technological approaches and skills to engage in their fields by evaluating information, analyzing data, and utilizing technologies relevant to their disciplines.
- Foundation 4: Communication, Students will be able to demonstrate the skills needed to communicate scientific, mathematical, and/or technical concepts to a variety of audiences.
- Foundation 5: Social Responsibility, Students will be able to demonstrate an awareness of the societal context in which science, mathematics, and technology operate by demonstrating a social awareness in order to understand the interplay between their field and society.