Educational Catalog

2021-2023

INSTITUTE OF SCIENCE AND TECHNOLOGY
NOTICE: At the discretion of the Institute of Science and Technology, information contained in this catalog is subject to change without prior notification. If there is any inconsistency or conflict between the information contained in this catalog and any other material, the information contained in the catalog shall take precedence. The Institute of Science and Technology is not responsible for information or claims made by individuals not affiliated with IST that is contrary to IST published material. Throughout this catalog, “IST” refers to Institute of Science and Technology.

Our mission is to make this world a better place through the advancement of applied science and scientific education.

INSTITUTE OF SCIENCE AND TECHNOLOGY
11020 N Ambassador Drive, Kansas City, Missouri 64153
www.Science.edu
Catalog Version: 20211221
# Table of Contents

## ABOUT IST
- Message from Our President ................................................................. 5
- Mission and Vision .................................................................................. 6
- Institute Mission-Based Learning Outcomes ............................................ 6
- Ownership and Authorization .................................................................. 8
- Academic Calendar .................................................................................. 8
- Hours of Operation .................................................................................. 8
- Contact Information .................................................................................. 9
- Instructional Facilities .............................................................................. 9
- Accreditation ............................................................................................ 10
- IST History ............................................................................................... 10
- Governance and Academic Leadership ..................................................... 13
- Academic Program Advisory Council ...................................................... 13

## PROGRAMS

### Undergraduate Degree Programs .......................................................... 14
- Associate of Science (A.S.) in Computer Science (Data Tech) .................. 15
- Associate of Science (A.S.) in Cyber Security (Cyber Tech) ..................... 16
- Associate of Science (A.S.) in E-Learning (Ed Tech) ............................... 18
- Bachelor of Science (B.S.) in Applied Chemistry ..................................... 21
- Bachelor of Science (B.S.) in Applied Physics and Engineering ............... 23
- Bachelor of Science (B.S.) in Electrical Engineering and Computer Science. 25
- Bachelor of Science (B.S.) in Cyber Security ........................................... 27
- Bachelor of Science (B.S.) in E-Learning ............................................... 29

### Graduate Degree Programs ................................................................... 32
- Master of Science (M.S.) in Cyber Security .............................................. 33
- Master of Education (M.Ed.) in E-Learning .............................................. 34
- Doctor of Science (Sc.D.) in Applied Chemistry ...................................... 37
- Doctor of Science (Sc.D.) in Applied Physics and Engineering ............... 39
- Doctor of Science (Sc.D.) in Electrical Engineering and Computer Science. 42
Student Complaint / Grievance Policy .................................................. 78
Sexual Harassment / Legal Compliance .................................................. 80

COURSE DESCRIPTIONS
General Education Courses ................................................................. 83
Chemistry Courses ................................................................................. 87
Cyber Security Courses ........................................................................ 92
E-Learning Courses ................................................................................ 100
Electrical Engineering and Computer Science Courses ....................... 107
English Courses ..................................................................................... 114
Inventioneering Courses ....................................................................... 115
Mathematics Courses ............................................................................ 121
Physics Courses ..................................................................................... 123
Final Project Courses ............................................................................. 127
Research Methodologies Courses ......................................................... 128
Dissertation Courses ............................................................................... 129
Message from our President

The Institute of Science and Technology (IST) was established for the advancement of science and scientific education.

In 1985, Dr. Roger Billings and a team of world-renowned science visionaries, including Dr. Geoffrey Pardoe from the UK, Dr. Alexei Tupolev from Russia, and Willis Hawkins from the United States – joined together to create an institution of higher learning to offer educational degree programs focused on the needs of improving and enhancing society.

Today’s best workplace opportunities require advanced technical skills and training. In cutting-edge fields such as cyber security, jobs and opportunities are abundant but qualified workers are few and inadequate. The undergraduate and graduate degree programs of the Institute of Science and Technology are hands-on, applied programs in which our students learn how to solve real-world challenges gaining requisite practical experience.

The Associates, Bachelors, Masters and Doctoral degree programs are applied programs that provide students with experience working on real-world projects in advanced and technical fields. These programs provide students with the strong multi-disciplinary foundation needed for success.

The applied nature of IST’s programs provides a unique and empowering experience for our students. We look forward to welcoming you to our institution on your path to a rewarding and successful career.

Sincerely,

Dr. Joseph Billings
President
Mission & Vision

The Mission of IST is to make this world a better place through the advancement of applied science and scientific education.

The Vision is that IST will be recognized as a leader in applied scientific education through practical and real-world training, thereby producing graduates that are prepared to make significant contributions for the betterment of society.

Now more than ever, people need easy access to practical education that will give them skills and knowledge they can take directly into the workplace. IST meets that need by providing high-quality, accessible education in fields of study that are in demand. IST provides a means for individuals to learn independent of time and place and to earn degrees that are credible to both academic institutions and employers to better serve the needs of today's technology rich environments.

The Programs offered at the Institute of Science and Technology are specifically focused in the areas of Applied Chemistry, Applied Physics and Engineering, Electrical Engineering and Computer Science, Cyber Security and E-Learning.

Institute Mission-Based Learning Outcomes

The successful graduate of IST will demonstrate the following attributes:

Effective Connector to the Digital World

- Undergraduate Learning Outcomes:
  
  - Students will be able to identify the rights, responsibilities, and opportunities of learning in an online environment.
  
  - Students will be able to identify, reflect, and respect the range of worldwide ethical perspectives and their impact of actions on others.

- Graduate Learning Outcomes:
  
  - Students will be able to synthesize and apply impactful strategies through understandings of complex cases in current society as it relates to scientific discovery and learning in our Digital World.

Creative and Innovative Communicator

- Undergraduate Learning Outcomes:
  
  - Students will be able to use reading, writing, listening, and speaking as communication tools to effectively express and communicate ideas.
Students will implement effective communication to speak, show, demonstrate, exhibit, or perform using a variety of media to convey complex solutions implementing change.

Students will be able to present multifaceted content that customizes the message for intended audiences.

Graduate Learning Outcomes:

Students will be able to effectively construct and communicate key concepts and ideas in verbal, non-verbal, and written forms to influence diverse audiences and decision makers in their field of study.

Critical Thinker for Knowledge Construction

Undergraduate Learning Outcomes:

Students will demonstrate reliable and valid data research strategies for intellectual or creative pursuits.

Students will find ways to express originality, imagination, and innovation working with complex and ambiguous situations to transform their learning.

Students will make decisions based upon understanding of scientific concepts and processes using observation and experimentation using appropriate technology and scientific reasoning.

Graduate Learning Outcomes:

Students will produce quantitative and/or qualitative research at the theoretical, strategic, and/or operational levels as a method to solve complex problems.

Students will critically analyze and construct divergent thinking to draw conclusions and generate plans for solving complex problems.

Students will be able to construct new science related to learning theory as they express originality, imagination, and innovation working with complex and ambiguous situations to transform their learning.

Technological and Research Proficiency

Undergraduate Learning Outcomes:

Students will access and use online and written information safely, ethically, and legally.

Students will demonstrate the ability to find, organize, understand, critically examine, and use information from various sources using a variety of technologies.

Students will identify the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world.
• Graduate Learning Outcomes:
  o Students will be able to effectively apply policies, reforms, and ethics through integrating information literacy competencies.

State Authorization

The Institute of Science and Technology is a 501(c)(3) Missouri Nonprofit Corporation.

The Institute of Science and Technology is legally authorized to confer degrees through an exemption granted by the Missouri Department of Higher Education and Workforce Development.

Academic Calendar

The traditional academic calendar with limited enrollment periods, holidays, and other significant dates is not applicable to IST. In IST’s continuous-enrollment model, students can start any day of the week all year long, which starts a new semester for that student. Students can access learning resources, watch video lessons, view grades, and complete online assessments any time, day or night, without regard to holidays and/or other significant dates.

A semester at IST is 15 weeks in length. The 15 weeks that make up a semester are based on when the student begins their program. It is the responsibility of every student to register for each semester. There is no automatic registration for classes / courses.

Hours of Operation

The Institute of Science and Technology is open throughout the year to serve current, prospective, and prior students. IST’s administrative office hours are as follows:

**Administrative Office Hours:**
Monday – Friday, 8:30 am – 5:00 pm (Central Time)

**Staff and Administration Holidays:**
IST observes the following holidays throughout the year for administration and staff. When the holidays fall on the weekend, IST will typically align with the federal observance, usually the Friday prior or the Monday following such holiday.

<table>
<thead>
<tr>
<th>Holiday</th>
<th>Trademark America</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Year’s Day</td>
<td>Labor Day</td>
</tr>
<tr>
<td>Spring Break (first full work-week of April)</td>
<td>Thanksgiving Day</td>
</tr>
</tbody>
</table>
Contact Information

The Institute of Science and Technology offers assistance and resources to students and alumni for administrative, instructional, and financial requests. The following departmental email addresses are provided for your convenience.

Institute of Science and Technology
11020 N Ambassador Drive
Kansas City, Missouri 64153

Phone: (816) 235-3500

Website: www.Science.edu

Department email addresses:
Admissions – admissions@science.edu
General Inquiries – info@science.edu
Student Services – studentservices@science.edu
Financial Service – financialservices@science.edu
Alumni Services – alumniservices@science.edu

Instructional Facilities

A majority of the coursework for all IST degree programs is performed online. IST’s doctoral courses are over 51% online but completed on-site as a residency to provide quality research opportunities. The doctoral coursework involves participation in "hands-on" applied research and Inventioneering. Labs and equipment for advanced research is provided on campus in Kansas City, Missouri.

Examples of IST's incredible research capabilities are provided on the IST website (Science.edu). Professional filming studios and lecture halls with broadcast equipment provide the means for faculty to connect with students at a distance.

Research Library - The Linda Hall Library is a nearby online research library with over 1,000,000 volumes, journal articles, and research papers.
Accreditation

Throughout its history, the Institute of Science and Technology has neither received or been denied accreditation. For over thirty years, the institution has legally granted degrees in the State of Missouri and produced graduates that are well-prepared and employed in various positions. Accreditation provides evidence that outside evaluators have carefully reviewed and approved IST’s programs and policies, and accreditation helps to enable the transfer of credits to other accredited institutions. IST is currently researching and undertaking the formal process of accreditation to validate the systems and infrastructure of the Institute.

Catalog Availability

The electronic catalog for the Institute of Science and Technology is available at any time by accessing the Institute website: www.science.edu. Prospective students are not required to provide any personal contact information for access or download.

IST History

The Institute of Science and Technology was founded in 1985 by a team of distinguished international scientists/entrepreneurs with a vision of creating an institute to promote science and science education for the betterment of society.

Each of the founders are renowned inventors and scientists in their fields:

**Sir Dr. Geoffrey Pardoe**, Chairman of the British Watt Committee on Energy and President of the Royal Aeronautical Society, was a champion of Britain’s early space efforts, deterrent weapon systems and European energy initiatives.

**Willis Hawkins** was instrumental in launching the Lockheed Missiles and Space Company and served as its President. Mr. Hawkins spent three years as Assistant Secretary for Research and Development with the United States Army and led the design team for the legendary C-130 Hercules aircraft. Willis Hawkins received the US National Medal of Science from President Ronald Reagan in 1988.

**Dr. Roger Billings**, mentee of Bill Lear (noted radio and aeronautical scientist and creator of the Lear Jet), is the inventor of the hydrogen automobile and a pioneer of hydrogen energy and fuel cell technologies. Dr. Billings developed one of the first micro-computers which included word-processing, accounting, and electronic mail software. He is the co-inventor of B² Cryptography and created the GoldKey Security System which is deployed by the U.S. military for authentication and encryption. Dr. Billings is Chairman and inventor of the Acellus Learning System, a learning accelerator that is used to provide online courses to over 6,500 K-12 schools.
Dr. Alexei Nicoli Tupolev is a Soviet aircraft designer who led the development of the first supersonic passenger jet and was instrumental in the design of the Soviet space shuttle. Dr. Tupolev taught classes in aircraft design and aerodynamics at the Moscow Aviation Institute.

In 1984, these founders began sharing their ideas and desires to create a new university program that would teach students to become true innovators and bring about new technologies through applied scientific research. They coined the word “Inventioneering” which is defined as “applying the art of scientific research to the useful acquisition of knowledge.”

This prestigious group wanted to create a formal graduate program at the doctoral level where the student would conduct original research and complete the engineering phase of transforming research breakthroughs into useful commercial technologies with the goal of improving the quality of life today and tomorrow. They envisioned a program in which doctoral students would take courses in diverse areas such as innovation, patent law, finance, sales, marketing and advertising in addition to specialized training programs that would combine science, engineering and business all in one degree.

In 1985, the institution was formally established and began seeking authorization to grant degrees from the Missouri Coordinating Board of Higher Education. In 1988, the institution was granted 501(c)(3) status by the Internal Revenue Service and in 1991, the institution achieved the legal status to grant doctoral degrees in the State of Missouri.

Since that time, IST has developed many programs at the undergraduate and graduate levels and graduated students in the fields of Applied Chemistry, Applied Physics and Engineering, Electrical Engineering and Computer Science, Cybersecurity and E-Learning – building upon the vision of teaching through hands-on, applied learning.

Throughout its history, IST has contributed advancements in science and technology. In 1991, the institution led a major research initiative in alternative fuels and developed the world’s first automobile powered by a hydrogen fuel cell. This innovation demonstrated significant increases in fuel efficiency as compared to internal combustion engines.

Beginning around 2000, IST through student projects, created the Science Information System (SIS) where scientists could publish their work and receive feedback from their colleagues. The three-part system provides for the responsible free flow of scientific information. The Encyclopedia of Science and Technology is a reference resource containing a compilation of scientific and technological information, the Journal of Science is a peer-reviewed technical journal published in an electronic format and the Scientific Community Registry is the compilation of background information regarding the worldwide membership of the Scientific Community. This Science Information System provides the venue for students to share their research and peer review other science projects and innovations.

In 2001, the Acellus Learning System was created as a result of a scientific study of the learning process. Acellus provides self-paced academic courseware for students to study online. This courseware was created as a learning environment for students to complete courses involving engaging video lessons, innovative teaching styles and personalized instruction in an online...
environment. Systems were put into place where student responses were tabulated and could measure student and courseware quality results.

IST’s electrical engineering and computer science programs have rapidly evolved to remain on the cutting-edge of the field. In 2013, IST students participated in a research initiative funded by the United States Army to reduce network latency to improve the speed of military data communications. IST students designed a custom silicon chip to power a nano-latency network switch, thereby reducing the latency by an order of magnitude.

Around this same time, IST expanded its programs to include cyber security in response to concerns regarding a nationwide shortage of cyber security professionals. In 2018, two IST faculty members announced the co-invention of b² Cryptography, a disruptive technology which solved the age-old problem of securely exchanging encryption keys, even over a public network. This cryptographic breakthrough has proven to be many times more secure than the commonly used alternative (PKI). b² Cryptography has been deployed by the Department of Defense and other Federal government agencies.

IST continues to serve as a catalyst for innovative thinking and bold exploration of cutting-edge scientific research. The technological breakthroughs achieved by IST students are a testament to our founders’ philosophy of providing a learning environment for applied research to advance science for the betterment of society.
Institute of Science and Technology Governance

Board of Directors
Dr. Martha Asay
Dr. Joseph Billings
Dr. Roger Billings
Dr. Jonathan Eyre
Dr. Julianna Habing
Dr. Maria Sanchez
Mr. Matthew Seerden

Academic Leadership

President
Dr. Joseph Billings

Vice President
Dr. Maria Sanchez

Chief Academic Officer
Dr. Ginger Hovenic

Advisory Council

IST’s advisory council is comprised of academicians and industry experts in various fields of knowledge. The Advisory Council is responsible for advising IST administration regarding trends in the field and provides valuable insight regarding IST’s programs and courses.

Advisory Council Members

Dr. Jacqueline Brooks – Superintendent, Macon County School District
Dr. Donald (Dusty) Delso – Superintendent Sovereign Community School
Dr. Patricia Dougherty – Executive Director, Phoenix Charter Academy
Marty Kobza – Superintendent, Superior School District
Dr. Pajet Monet – Electrical Engineer
Dr. Marisa Sarian – Former Assistant Superintendent, Pasadena Unified School District
Jon Thomas – Vice President, CybrSecurity Corporation
Undergraduate Degree Programs

**Associate Degree Programs**
- Associate of Science in Computer Science (Data Tech)
- Associate of Science in Cyber Security (Cyber Tech)
- Associate of Science in E-Learning (Ed Tech)

**Bachelor’s Degree Programs**
- Bachelor of Science in Applied Chemistry
- Bachelor of Science in Applied Physics and Engineering
- Bachelor of Science in Electrical Engineering & Computer Science
- Bachelor of Science in Cyber Security
- Bachelor of Science in E-Learning
ASSOCIATE OF SCIENCE DEGREE PROGRAMS

The IST Associate of Science degree programs are specialty programs aimed at preparing students for the rigors of working in high-tech industry by learning cutting-edge technologies in a hands-on, project-based learning environment. Each program is focused in a field where there is a high demand for competent skilled workers.

Associate of Science in Computer Science (Data Tech)

The IST Associate of Science in Computer Science degree (Data Tech) program prepares students for an entry-level position in high-tech industry as part of an IT department. In this program, students gain the foundational understanding and hands-on skills needed to be proficient in web design and development. Student learning is maximized as they engage in applied project-based instruction. In addition, students enrolled in this program acquire a basic understanding of Ethernet and TCP/IP networking, including best practices for configuring, analyzing, and fixing networks. Students completing this program are prepared with the understanding and practical skills needed to take the CompTIA Network+ certification exam and obtain this industry-recognized credentials verifying their skills and job-readiness.

Associate Program Educational Objectives

- Mastery of introductory computer science principles, including basic programming skills.
- Creative application of basic web design.
- Ability to configure, analyze, and fix computer networking systems.
- Ability to explore diverse technologies, work with industry experts, refine technology and soft skills, and build a portfolio of real project experience.
- Ability to communicate, both orally and in writing.
- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

DATA TECH PROGRAM OF STUDY

<table>
<thead>
<tr>
<th>General Education</th>
<th>15 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science</td>
<td>21 credits</td>
</tr>
<tr>
<td>*EECS104. Computer Science Principles (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*EECS126. HTML5 and CSS (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*EECS127. JavaScript (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*EECS232. CSS with Tailwind I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*EECS233. CSS with Tailwind II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*EECS245. React JavaScript I (3 credits)</td>
<td></td>
</tr>
</tbody>
</table>
*EECS246. React JavaScript II (3 credits)

**Cyber Security**
*CYBR102. CompTIA Network+ I (3 credits)
*CYBR103. CompTIA Network+ II (3 credits)

**Inventioneering**
*INVN190. Technical Entrepreneurship I (4 credits)
*INVN191. Technical Entrepreneurship II (4 credits)
*INVN290. Innovation I (4 credits)

**English**
*ENGL207. Technical Writing I (3 credits)
*ENGL208. Technical Writing II (3 credits)

<table>
<thead>
<tr>
<th>Course Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyber Security</td>
<td>6 credits</td>
</tr>
<tr>
<td>Inventioneering</td>
<td>12 credits</td>
</tr>
<tr>
<td>English</td>
<td>6 credits</td>
</tr>
<tr>
<td>TOTAL</td>
<td>60 credits</td>
</tr>
</tbody>
</table>

**Learning Outcomes:**
1. An understanding of basic principles of computer science that underlie modern technologies.
2. The ability to design basic web pages.
3. An understanding of computer networks and the ability to configure, analyze, and fix them.
4. The ability to work with industry experts, refine technology and soft skills, and build a portfolio of real-world project experience.
5. The ability to effectively communicate, both orally and in writing.

* Required courses

**Associate of Science in Cyber Security (Cyber Tech)**

The IST Associate of Science in Cyber Security degree (Cyber Tech) program has been developed to provide students with the knowledge and hands-on practical skills needed for employment in an entry-level cyber security position within an organization. In this program, students are provided training on current cyber security strategies and best practices. Student learning is maximized as they engage in applied project-based instruction. In addition, students enrolled in this program are provided the requisite instruction and hands-on experience needed for CompTIA Network+ and Security+ industry-recognized certifications, credentials widely sought-after by employers.

**Associate Program Educational Objectives**

- Mastery of the basic principles of cyber security, including performing penetration testing.
• Ability to utilize state-of-the-art security technologies to secure computer data.

• Mastery of introductory computer science principles.

• Ability to configure, analyze, and fix computer networking systems.

• Ability to explore diverse technologies, work with industry experts, refine technology and soft skills, and build a portfolio of real project experience.

• Ability to communicate, both orally and in writing.

• Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**CYBER TECH PROGRAM OF STUDY**

<table>
<thead>
<tr>
<th>General Education</th>
<th>15 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyber Security</td>
<td>24 credits</td>
</tr>
<tr>
<td>*CYBR102. CompTIA Network+ I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR103. CompTIA Network+ II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR253. Computer Security Fundamentals I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR254. Computer Security Fundamentals II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR262. The Trusted Internet (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR264. CyberID, User Authentication and Credentials (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR267. Penetration Testing I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CYBR268. Penetration Testing II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td>3 credits</td>
</tr>
<tr>
<td>*EECS104. Computer Science Principles (3 credits)</td>
<td></td>
</tr>
<tr>
<td>Inventionering</td>
<td>12 credits</td>
</tr>
<tr>
<td>*INVN190. Technical Entrepreneurship I (4 credits)</td>
<td></td>
</tr>
<tr>
<td>*INVN191. Technical Entrepreneurship II (4 credits)</td>
<td></td>
</tr>
<tr>
<td>*INVN290. Innovation I (4 credits)</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>6 credits</td>
</tr>
<tr>
<td>*ENGL207. Technical Writing I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ENGL208. Technical Writing II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>60 credits</td>
</tr>
</tbody>
</table>

**Learning Outcomes:**

1. An understanding of basic principles of cyber security, including the ability to perform penetration testing.
2. An understanding of $b^2$ cryptography and the ability to install and support a hardware-based key management system providing enterprise-wide data security.
3. An understanding of basic principles of computer science that underlie modern technologies.
4. An understanding of computer networks and the ability to configure, analyze, and fix them.
5. The ability to work with industry experts, refine technology and soft skills, and build a portfolio of real-world project experience.
6. The ability to effectively communicate, both orally and in writing.

* Required courses

**Associate of Science in E-Learning (Ed Tech)**

The IST Associate of Science in E-Learning degree (Ed Tech) program has been developed to provide students with the knowledge and hands-on practical skills needed for employment in an entry-level e-learning position within a school. Student learning is maximized as they engage in applied project-based instruction. IST students learn basic strategies for supporting teachers, implementing effective interventions, and improving student outcomes in an online learning environment.

**Associate Program Educational Objectives**

- Mastery of e-Learning principles, deployment options, and best practices.
- Mastery of learning management system tools.
- Mastery of various techniques available in an e-learning system to improve student outcomes.
- Ability to work with industry experts, refine technology and soft skills, and build a portfolio of real project experience.
- Ability to communicate, both orally and in writing.
- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**ED TECH PROGRAM OF STUDY**

<table>
<thead>
<tr>
<th>General Education</th>
<th>15 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Learning</td>
<td>24 credits</td>
</tr>
</tbody>
</table>
*ELRN101. Introduction to E-Learning (3 credits)
*ELRN106. Deployment Options for E-Learning (3 credits)
*ELRN127. E-Learning Teaching Tools for Engagement and Impact (3 credits)
*ELRN133. Learning Management System (LMS) Configuration (3 credits)
*ELRN221. Techniques for Importing Students into an LMS (3 credits)
*ELRN229. Effective Strategies for Monitoring Students Online (3 credits)
*ELRN263. Using Intervention Strategies in the Learning Process (3 credits)
*ELRN274. Applying Strategies of the Success Zone Model (3 credits)

**Computer Science**
- 3 credits
  *EECS104. Computer Science Principles (3 credits)

**Inventioneering**
- 12 credits
  *INVN190. Technical Entrepreneurship I (4 credits)
  *INVN191. Technical Entrepreneurship II (4 credits)
  *INVN290. Innovation I (4 credits)

**English**
- 6 credits
  *ENGL207. Technical Writing I (3 credits)
  *ENGL208. Technical Writing II (3 credits)

**TOTAL**
- 60 credits

**Learning Outcomes:**

1. An understanding of e-learning, including various deployment options, and best practices.
2. The ability to effectively use the various tools available in an e-learning LMS.
3. The ability to utilize various techniques within an e-learning system to improve student outcomes.
4. The ability to work with e-learning professionals, refine technology and soft skills, and build a portfolio of real-world project experience.
5. An understanding of basic principles of computer science that underlie modern e-learning technologies.
6. The ability to effectively communicate, both orally and in writing.

* Required courses

**GENERAL EDUCATION COURSES**

CHEM123. Introduction to Chemistry (3 credits)
CHEM130. Basic Chemistry (3 credits)
EECS104. Computer Science Principles (3 credits)
EECS105. Intro to Computer Science (3 credits)
ENGL101. English Composition (3 credits)
ENGL102. English Literature (3 credits)
HUFA105. Drawing (3 credits)
HUFA114. Music Theory (3 credits)
HUFA137. Collaborative Theatre (3 credits)
MATH101. Technical Math (3 credits)
MATH103. Business Math (3 credits)
MATH105. College Algebra (3 credits)
MATH106. Analytical Geometry & Trigonometry (3 credits)
MATH108. Statistics (3 credits)
MATH110. Introduction to Calculus (3 credits)
MATH111. Calculus I (3 credits)
MATH112. Calculus II (3 credits)
PHYS151. Introduction to Physics (3 credits)
PHYS171. Fundamentals of Physics (3 credits)
SCIE107. Biology (3 credits)
SCIE172. Environmental Science (3 credits)
SOCS108. US History (3 credits)
SOCS111. European History (3 credits)
SOCS123. World History (3 credits)
SOCS135. Psychology (3 credits)

BACHELOR OF SCIENCE DEGREE PROGRAMS

The IST Bachelor of Science degree programs prepare students for careers in applied research, technology innovation, and entrepreneurship. The degree program was created to fill a void in the availability of advanced degree training in “inventioneering”, the science of putting science to work for the betterment of mankind.

According to the Cambridge Dictionary, science is the careful study of the structure and behavior of the physical world, especially by watching, measuring, and doing experiments, and the development of theories to describe the results of these activities. Basic or pure science is focused on advancing scientific theories and laws that explain and predict events in the natural world.

Inventioneering relates to the practical application of science. It accesses and uses accumulated theories, knowledge, methods, and techniques, for a specific client-driven purpose. Applied research usually has specific commercial objectives related to products, procedures, or services. It deals with solving practical problems and generally employs empirical methodologies.

The inventioneer starts with basic science, which is focused on advancing scientific theories and laws, and pulling from that basic foundation, uses the scientific method to discover practical applications and uses for the pure knowledge.
Majors:

- Applied Chemistry
- Applied Physics and Engineering
- Electrical Engineering and Computer Science
- Cyber Security
- E-Learning

Degree Requirement: 120 credits

**Bachelor of Science in Applied Chemistry**

**Program Description:** The IST Bachelor of Science in Applied Chemistry degree program is for individuals interested in chemistry and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master the foundational skills and knowledge of general chemistry. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in applied chemistry research, product development, and services.

**Undergraduate Program Educational Objectives**

- Mastery of the basic principles of the science of chemistry, including reaction kinetics, thermodynamics, materials, catalysts and laboratory procedures.

- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

- Creative application of the basic principles of chemistry and applied research to the solution of a broad range of commercial applications and career paths.

- Ability to communicate concepts and programs of applied chemistry effectively, both orally and in writing.

- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**APPLIED CHEMISTRY DEGREE PROGRAM OF STUDY**

<table>
<thead>
<tr>
<th>General Education</th>
<th>30 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>30 credits</td>
</tr>
<tr>
<td>*CHEM123. Introduction to Chemistry (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CHEM130. Basic Chemistry (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CHEM245. General Chemistry I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*CHEM246. General Chemistry II (3 credits)</td>
<td></td>
</tr>
</tbody>
</table>
*CHEM247. General Chemistry III (3 credits)
*CHEM248. General Chemistry IV (3 credits)
*CHEM305. Materials Science I (3 credits)
*CHEM306. Materials Science II (3 credits)
*CHEM421. Chemical Processes I (3 credits)
*CHEM422. Chemical Processes II (3 credits)

### Physics
- 6 credits
  - *PHYS151. Introduction to Physics (3 credits)
  - *PHYS171. Fundamentals of Physics (3 credits)

### Calculus
- 6 credits
  - *MATH111. Calculus I (3 credits)
  - *MATH112. Calculus II (3 credits)

### English
- 6 credits
  - *ENGL207. Technical Writing I (3 credits)
  - *ENGL208. Technical Writing II (3 credits)

### Inventioneering
- 32 credits
  - *INVN190. Technical Entrepreneurship I (4 credits)
  - *INVN191. Technical Entrepreneurship II (4 credits)
  - *INVN290. Innovation I (4 credits)
  - *INVN291. Innovation II (4 credits)
  - *INVN390. Creativity in Research I (4 credits)
  - *INVN391. Creativity in Research II (4 credits)
  - *INVN490. Disruption Technology I (4 credits)
  - *INVN491. Disruption Technology II (4 credits)

### Senior Project
- 10 credits
  - *PROJ498. Senior Project I (5 credits)
  - *PROJ499. Senior Project II (5 credits)

**TOTAL** 120 credits

---

**Learning Outcomes**

1. The ability to apply basic principles of chemistry and carry out laboratory procedures that underlie modern chemical technologies.
2. An understanding of reaction kinetics and how to predict the rate of a chemical reaction.
3. The ability to use thermodynamics to analyze and evaluate process components and systems.
4. An understanding of the benefits of catalysts and how, when, and where to use them.
5. An understanding of the properties of materials and how to select the best material for specific applications.
6. The ability to understand and use advanced mathematical concepts required to analyze and evaluate many applied chemistry systems.
7. An understanding of basic principles of physics and the ability to solve real-world problems explaining physical phenomena.
8. The ability to find creative new technological ideas and create value from them through applied research.
9. The ability to communicate applied chemistry concepts effectively, both orally and in writing.
10. The ability to implement a creative application of basic principles of chemistry and applied research to the solution of a commercial application.

* Required Courses

**Bachelor of Science in Applied Physics and Engineering**

**Program Description:** The IST Bachelor of Science in Applied Physics and Engineering degree program is for individuals interested in physics and engineering and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master the foundational skills and knowledge of general physics and engineering. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in applied physics and engineering research, product development, and services.

**Undergraduate Program Educational Objectives**

- Mastery of the basic principles of the science of physics, including the fundamental laws, thermodynamics, quantum and nuclear physics.

- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

- Creative application of the basic principles of physics and engineering and applied research to the solution of a broad range of commercial applications and career paths.

- Ability to communicate concepts and programs of applied physics and engineering effectively, both orally and in writing.

- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**APPLIED PHYSICS AND ENGINEERING DEGREE PROGRAM OF STUDY**

<table>
<thead>
<tr>
<th>General Education</th>
<th>30 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>30 credits</td>
</tr>
</tbody>
</table>

*PHYS151. Introduction to Physics (3 credits)
*PHYS171. Fundamentals of Physics (3 credits)
*PHYS201. General Physics I (3 credits)
*PHYS202. General Physics II (3 credits)
PHYS203. General Physics III (3 credits)
PHYS204. General Physics IV (3 credits)
PHYS398. Engineering and Thermodynamics I (3 credits)
PHYS399. Engineering and Thermodynamics II (3 credits)
PHYS400. Engineering and Thermodynamics III (3 credits)
PHYS401. Engineering and Thermodynamics IV (3 credits)

Math 12 credits
* MATH111. Calculus I (3 credits)
* MATH112. Calculus II (3 credits)
* MATH322. Fundamentals of Differential Equations I (3 credits)
* MATH323. Fundamentals of Differential Equations II (3 credits)

English 6 credits
* ENGL207. Technical Writing I (3 credits)
* ENGL208. Technical Writing II (3 credits)

Inventioneering 32 credits
* INVN190. Technical Entrepreneurship I (4 credits)
* INVN191. Technical Entrepreneurship II (4 credits)
* INVN290. Innovation I (4 credits)
* INVN291. Innovation II (4 credits)
* INVN390. Creativity in Research I (4 credits)
* INVN391. Creativity in Research II (4 credits)
* INVN490. Disruption Technology I (4 credits)
* INVN491. Disruption Technology II (4 credits)

Senior Project 10 credits
* PROJ498. Senior Project I (5 credits)
* PROJ499. Senior Project II (5 credits)

TOTAL 120 credits

Learning Outcomes
1. An understanding of basic principles of physics and the ability to solve real-world problems explaining physical phenomena.
2. The ability to use the fundamental laws of physics to perform calculations to better understand the way this work in the world.
3. The ability to use thermodynamics to analyze and evaluate process components and systems.
4. An understanding of quantum mechanics and the motion and interaction of subatomic particles.
5. An understanding of nuclear physics and reaction energy associated with fission and fusion.
6. The ability to understand and use advanced mathematical concepts required to analyze and evaluate many applied physics and engineering systems.
7. The ability to find creative new technological ideas and create value from them through applied research.
8. The ability to communicate applied physics and engineering concepts effectively, both orally and in writing.

9. The ability to implement a creative application of basic principles of applied physics and engineering and applied research to the solution of a commercial application.

* Required Courses

**Bachelor of Science in Electrical Engineering and Computer Science**

**Program Description:** The IST Bachelor of Science in Electrical Engineering and Computer Science degree program is for individuals interested in electrical engineering and computer science and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master the foundational skills and knowledge of electrical engineering and computer science. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in electrical engineering and computer science research, product development, and services.

**Undergraduate Program Educational Objectives**

- Mastery of the basic principles of computer science, including operating systems, cloud computing, data base, and programming.

- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

- Creative application of the basic principles of electrical engineering and computer science and applied research to the solution of a broad range of commercial applications and career paths.

- Ability to communicate concepts and programs of electrical engineering and computer science effectively, both orally and in writing.

- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**ELECTRICAL ENGINEERING AND COMPUTER SCIENCE DEGREE**

**PROGRAM OF STUDY**

<table>
<thead>
<tr>
<th>General Education</th>
<th>30 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Engineering and Computer Science</td>
<td>30 credits</td>
</tr>
<tr>
<td>Course</td>
<td>Credits</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>*EECS126. HTML5 and CSS</td>
<td>3</td>
</tr>
<tr>
<td>*EECS127. JavaScript</td>
<td>3</td>
</tr>
<tr>
<td>*EECS232. CSS with Tailwind I</td>
<td>3</td>
</tr>
<tr>
<td>*EECS233. CSS with Tailwind II</td>
<td>3</td>
</tr>
<tr>
<td>*EECS245. React JavaScript I</td>
<td>3</td>
</tr>
<tr>
<td>*EECS246. React JavaScript II</td>
<td>3</td>
</tr>
<tr>
<td>*EECS357. Cassandra I</td>
<td>3</td>
</tr>
<tr>
<td>*EECS358. Cassandra II</td>
<td>3</td>
</tr>
<tr>
<td>*EECS481. Golang I</td>
<td>3</td>
</tr>
<tr>
<td>*EECS482. Golang II</td>
<td>3</td>
</tr>
<tr>
<td><strong>Cyber Security</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>*CYBR102. CompTIA Network+ I</td>
<td>3</td>
</tr>
<tr>
<td>*CYBR103. CompTIA Network+ II</td>
<td>3</td>
</tr>
<tr>
<td>*CYBR462. Linux Essentials I</td>
<td>3</td>
</tr>
<tr>
<td>*CYBR463. Linux Essentials II</td>
<td>3</td>
</tr>
<tr>
<td><strong>English</strong></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td>*ENGL207. Technical Writing I</td>
<td>3</td>
</tr>
<tr>
<td>*ENGL208. Technical Writing II</td>
<td>3</td>
</tr>
<tr>
<td><strong>Inventioneering</strong></td>
<td><strong>32</strong></td>
</tr>
<tr>
<td>*INVN190. Technical Entrepreneurship I</td>
<td>4</td>
</tr>
<tr>
<td>*INVN191. Technical Entrepreneurship II</td>
<td>4</td>
</tr>
<tr>
<td>*INVN290. Innovation I</td>
<td>4</td>
</tr>
<tr>
<td>*INVN291. Innovation II</td>
<td>4</td>
</tr>
<tr>
<td>*INVN390. Creativity in Research I</td>
<td>4</td>
</tr>
<tr>
<td>*INVN391. Creativity in Research II</td>
<td>4</td>
</tr>
<tr>
<td>*INVN490. Disruption Technology I</td>
<td>4</td>
</tr>
<tr>
<td>*INVN491. Disruption Technology II</td>
<td>4</td>
</tr>
<tr>
<td><strong>Senior Project</strong></td>
<td><strong>10</strong></td>
</tr>
<tr>
<td>*PROJ498. Senior Project I</td>
<td>5</td>
</tr>
<tr>
<td>*PROJ499. Senior Project II</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

**Learning Outcomes**

1. An understanding of basic principles of computer science that underlie modern technologies.
2. An understanding of modern operating systems and their design.
3. An understanding of the basic principles behind cloud computing.
4. The ability to configure and use databases and to store and manipulate data.
5. The ability to program in various programming languages.
6. An understanding of computer networks and how to configure, analyze, and maintain them.
7. The ability to find creative new technological ideas and create value from them through applied research.
8. The ability to communicate electrical engineering and computer science concepts effectively, both orally and in writing.
9. The ability to implement a creative application of basic principles of electrical engineering and computer science and applied research to the solution of a commercial application.

* Required Courses

**Bachelor of Science in Cyber Security**

**Program Description:** The IST Bachelor of Science in Cyber Security degree program is for individuals interested in cyber security and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master the foundational skills and knowledge of cyber security. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in cyber security research, product development, and services.

**Undergraduate Program Educational Objectives**

- Mastery of the basic principles of cyber security, including best practices, threat avoidance, penetration testing, secure authentication, and end-to-end data encryption.

- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

- Creative application of the basic principles of cyber security and applied research to the solution of a broad range of commercial applications and career paths.

- Ability to communicate concepts and programs of cyber security effectively, both orally and in writing.

- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**CYBER SECURITY DEGREE PROGRAM OF STUDY**

<table>
<thead>
<tr>
<th>General Education</th>
<th>30 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyber Security</td>
<td>30 credits</td>
</tr>
<tr>
<td>CYBR102. CompTIA Network+ I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR103. CompTIA Network+ II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR253. Computer Security Fundamentals I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR254. Computer Security Fundamentals II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR267. Penetration Testing I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR268. Penetration Testing II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR377. Advanced Cyber Security Practices I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>CYBR378. Advanced Cyber Security Practices II (3 credits)</td>
<td></td>
</tr>
</tbody>
</table>
*CYBR483. Network Defense and Countermeasures I (3 credits)
*CYBR484. Network Defense and Countermeasures II (3 credits)

**Computer Science**  
12 credits
- EECS126. HTML5 and CSS (3 credits)
- EECS127. JavaScript (3 credits)
- EECS462. Linux Essentials I (3 credits)
- EECS463. Linux Essentials II (3 credits)

**English**  
6 credits
- ENGL207. Technical Writing I (3 credits)
- ENGL208. Technical Writing II (3 credits)

**Inventioneering**  
32 credits
- INVN190. Technical Entrepreneurship I (4 credits)
- INVN191. Technical Entrepreneurship II (4 credits)
- INVN290. Innovation I (4 credits)
- INVN291. Innovation II (4 credits)
- INVN390. Creativity in Research I (4 credits)
- INVN391. Creativity in Research II (4 credits)
- INVN490. Disruption Technology I (4 credits)
- INVN491. Disruption Technology II (4 credits)

**Senior Project**  
10 credits
- PROJ498. Senior Project I (5 credits)
- PROJ499. Senior Project II (5 credits)

**TOTAL**  
120 credits

**Learning Outcomes**
1. An understanding of basic principles of cyber security.
3. The ability to implement threat avoidance strategies.
4. The ability to perform penetration testing.
5. An understanding of secure authentication methods and end-to-end encryption for secure communication over a computer network.
6. The ability to design and code web pages.
7. The ability to use Linux command line prompts.
8. The ability to find creative new technological ideas and create value from them through applied research.
9. The ability to communicate cyber security concepts effectively, both orally and in writing.
10. The ability to implement a creative application of basic principles of cyber security and applied research to the solution of a commercial application.

* Required Courses
Bachelor of Science in E-Learning

Program Description: The IST Bachelor of Science in E-Learning degree program is for individuals interested in e-learning and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master the foundational skills and knowledge of e-learning. Building upon this foundation, students are taught the core principles and methodologies of inventioneer and applied research preparing them for careers in e-learning research, product development, and services.

Undergraduate Program Educational Objectives

• Mastery of the basic principles of e-learning, including asynchronous teaching online, fundamentals of multimedia learning, and best practices for student motivation in distance learning environments.

• Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

• Creative application of the basic principles of e-learning and applied research to the solution of a broad range of commercial applications and career paths.

• Ability to communicate concepts and programs of e-learning effectively, both orally and in writing.

• Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

E-LEARNING DEGREE PROGRAM OF STUDY

<table>
<thead>
<tr>
<th>General Education</th>
<th>30 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Learning</td>
<td>30 credits</td>
</tr>
<tr>
<td>*ELRN153. Technology and Media for Learning (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN225. Learning with Technology I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN226. Learning with Technology II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN363. Multimedia Learning I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN364. Multimedia Learning II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN365. Multimedia Learning III (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN398. Acellus Learning Accelerator I (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN399. Acellus Learning Accelerator II (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN400. Acellus Learning Accelerator III (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*ELRN401. Acellus Learning Accelerator IV (3 credits)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Computer Science</th>
<th>6 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*EECS126. HTML5 and CSS (3 credits)</td>
<td></td>
</tr>
<tr>
<td>*EECS127. JavaScript (3 credits)</td>
<td></td>
</tr>
</tbody>
</table>
Cyber Security 6 credits
*CYBR102. CompTIA Network+ I (3 credits)
*CYBR103. CompTIA Network+ II (3 credits)

English 6 credits
*ENGL207. Technical Writing I (3 credits)
*ENGL208. Technical Writing II (3 credits)

Inventioneering 32 credits
*INVN190. Technical Entrepreneurship I (4 credits)
*INVN191. Technical Entrepreneurship II (4 credits)
*INVN290. Innovation I (4 credits)
*INVN291. Innovation II (4 credits)
*INVN390. Creativity in Research I (4 credits)
*INVN391. Creativity in Research II (4 credits)
*INVN490. Disruption Technology I (4 credits)
*INVN491. Disruption Technology II (4 credits)

Senior Project 10 credits
*PROJ498. Senior Project I (5 credits)
*PROJ499. Senior Project II (5 credits)

TOTAL 120 credits

Learning Outcomes

1. An understanding of basic principles of e-learning.
2. An understanding of asynchronous teaching online.
3. An understanding of the fundamentals of multimedia learning.
4. The ability to implement best practices for student motivation in distance learning environments.
5. The ability to design and code web pages.
7. The ability to find creative new technological ideas and create value from them through applied research.
8. The ability to communicate e-learning concepts effectively, both orally and in writing.
9. The ability to implement a creative application of basic principles of e-learning and applied research to the solution of a commercial application.

* Required Courses

GENERAL EDUCATION COURSES

CHEM123. Introduction to Chemistry (3 credits)
CHEM130. Basic Chemistry (3 credits)
EECS104. Computer Science Principles (3 credits)
EECS105. Intro to Computer Science (3 credits)
ENGL101. English Composition (3 credits)
ENGL102. English Literature (3 credits)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUFA105</td>
<td>Drawing</td>
<td>3</td>
</tr>
<tr>
<td>HUFA114</td>
<td>Music Theory</td>
<td>3</td>
</tr>
<tr>
<td>HUFA137</td>
<td>Collaborative Theatre</td>
<td>3</td>
</tr>
<tr>
<td>MATH101</td>
<td>Technical Math</td>
<td>3</td>
</tr>
<tr>
<td>MATH103</td>
<td>Business Math</td>
<td>3</td>
</tr>
<tr>
<td>MATH105</td>
<td>College Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH106</td>
<td>Analytical Geometry &amp; Trigonometry</td>
<td>3</td>
</tr>
<tr>
<td>MATH108</td>
<td>Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH110</td>
<td>Introduction to Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH111</td>
<td>Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>MATH112</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS151</td>
<td>Introduction to Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS171</td>
<td>Fundamentals of Physics</td>
<td>3</td>
</tr>
<tr>
<td>SCIE107</td>
<td>Biology</td>
<td>3</td>
</tr>
<tr>
<td>SCIE172</td>
<td>Environmental Science</td>
<td>3</td>
</tr>
<tr>
<td>SOCS108</td>
<td>US History</td>
<td>3</td>
</tr>
<tr>
<td>SOCS111</td>
<td>European History</td>
<td>3</td>
</tr>
<tr>
<td>SOCS123</td>
<td>World History</td>
<td>3</td>
</tr>
<tr>
<td>SOCS135</td>
<td>Psychology</td>
<td>3</td>
</tr>
</tbody>
</table>
Graduate Degree Programs

Master’s Degree Programs
- Master of Science in Cyber Security
- Master of Education in E-Learning

Doctoral Degree Programs
- Doctor of Science in Applied Chemistry
- Doctor of Science in Applied Physics and Engineering
- Doctor of Science in Electrical Engineering and Computer Science
- Doctor of Science in Cyber Security
- Doctor of Education (Ed.D.) in E-Learning
MASTERS DEGREE PROGRAMS

The IST Master's degree programs provide terminal degrees in specialty areas where demand for qualified professionals is particularly great.

**Majors:**
- Cyber Security (M.S.)
- E-Learning (M.Ed.)

**Degree Requirements:** 30 graduate credit hours

**Master of Science in Cyber Security**

**Program Description:** The Master of Science in Cyber Security degree program prepares students with the advanced practical skills and training needed to build effective cybersecurity programs and policies and respond and guard against cyberattacks. In addition, students are prepared for highly-respected certifications, including CompTIA’s Cybersecurity Analyst (CySA+) and (ISC)²’s Certified Information Systems Security Professional (CISSP). CISSP is one of the most sought-after professional certifications available in the security industry. It stands out as the premier credential for information security leaders, identifying those who possess the advanced technical skills and knowledge to design, implement, and manage a best-in-class cyber security program.

**Master's Program Educational Objectives**

- Mastery of effective, up-to-date tactics that can be used to respond to advanced cyberattacks.
- Ability to build effective cyber security programs and policies for an enterprise.
- Mastery of conceptual knowledge and hands-on skills required to leverage intelligence and threat detection techniques, analyze and interpret data, identify and address vulnerabilities, suggest preventative measures, and effectively respond to and recover from incidents.
- Mastery of the advanced technical skills and knowledge to design, implement, and manage, a best-in-class cyber security program.
- Ability to implement a creative cyber security application and communicate cyber security concepts and practices effectively, both orally and in writing.
- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.
CYBER SECURITY DEGREE PROGRAM OF STUDY

Cyber Security

- *CYBR515. Applied Incident Response I (3 graduate credits)
- *CYBR516. Applied Incident Response II (3 graduate credits)
- *CYBR527. Advanced Cyber Security Policies I (3 graduate credits)
- *CYBR528. Advanced Cyber Security Policies II (3 graduate credits)
- *CYBR545. Cybersecurity Analyst I (3 graduate credits)
- *CYBR546. Cybersecurity Analyst II (3 graduate credits)
- *CYBR588. Certified Information Systems Security Professional I (3 graduate credits)
- *CYBR589. Certified Information Systems Security Professional II (3 graduate credits)
- *PROJ598. Capstone Project (3 graduate credits)
- *PROJ599. Capstone Project (3 graduate credits)

TOTAL: 30 graduate credits

Learning Outcomes

1. The ability to deploy the most up-to-date strategies in response to advanced cyberattacks.
2. The ability to build effective cyber security programs and policies for an enterprise.
3. The ability to use intelligence and threat detection methods, analyze and interpret data, identify and address security vulnerabilities, suggest preventative measures, and effectively respond to and recover from incidents.
4. The ability to design, implement, and manage, a best-in-class cyber security program.
5. The ability to implement a creative cyber security application.
6. The ability to communicate cyber security concepts effectively, both orally and in writing.

* Required courses

Master of Education in E-Learning

As the Internet’s impact on society continues to evolve, educators are turning to technology to effectively engage students, improve learner performance, and enhance the quality of learning experiences. Technology has introduced the ability to adapt instruction in real-time to the needs of each learner based upon analysis of student data. For over 20 years, IST has been at the forefront of this evolution with the creation and development of the Acellus Learning System – now in use by over 6,500 schools across the Nation.

The IST Masters of Education in E-Learning degree program is for educators interested in being able to set up and operate an effective e-learning program for their school. Participants in this program learn best practices for configuring the system and using its many features to maximize...
e-learner outcomes. In addition, participants gain insights into techniques that can be used to keep the e-learner motivated and making steady progress toward achieving their learning goals.

Graduate Program Educational Objectives

• Mastery of advanced principles of e-learning, including asynchronous teaching instruction and multimedia learning.

• Ability to effectively configure, operate, and administer an e-learning LMS.

• Ability to utilize the e-learning system for effective and timely interventions.

• Ability to motivate, encourage, and provide effective instruction to e-learners.

• Ability to communicate concepts and programs of e-learning effectively, both orally and in writing.

• Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

E-LEARNING DEGREE PROGRAM OF STUDY

E-Learning

*ELRN501. E-Learning Principles and Practice (3 graduate credits)
*ELRN505. Configuration Best Practices for E-Learning LMS (3 graduate credits)
*ELRN507. Best Practices for Teaching Over the Internet (3 graduate credits)
*ELRN509. Motivation and Empowerment Strategies to Enhance Student Outcomes (3 graduate credits)
*ELRN511. Designing Effective Feedback and Intervention Processes (3 graduate credits)
*ELRN512. Principles Behind Writing Meaningful Assessments (3 credits)
*ELRN521. E-Learning and the Science of Instruction I (3 graduate credits)
*ELRN522. E-Learning and the Science of Instruction II (3 graduate credits)
*PROJ598. Graduate Capstone Project I (3 graduate credits)
*PROJ599. Graduate Capstone Project II (3 graduate credits)

TOTAL: 30 graduate credits

Learning Outcomes

1. An understanding of the advanced principles of e-learning, including asynchronous teaching instruction and multimedia learning.
2. The ability to effectively configure, operate and administer an e-learning LMS.
3. The ability to deploy an e-learning system for effective interventions.
4. The ability to motivate e-learners and provide effective instruction.
5. The ability to implement a creative application of e-learning.
6. The ability to communicate e-learning concepts effectively, both orally and in writing.

* Required courses
DOCTORATE DEGREE PROGRAMS

The IST Doctor of Science degree programs prepare students for careers in applied research, technology innovation, and entrepreneurship. The degree program was created to fill a void in the availability of advanced degree training in “inventioneering,” the science of putting science to work for the betterment of mankind.

According to the Cambridge Dictionary, science is the careful study of the structure and behavior of the physical world, especially by watching, measuring, and doing experiments, and the development of theories to describe the results of these activities. Basic or pure science is focused on advancing scientific theories and laws that explain and predict events in the natural world.

Inventioneering relates to the practical application of science. It accesses and uses accumulated theories, knowledge, methods, and techniques, for a specific client-driven purpose. Applied research usually has specific commercial objectives related to products, procedures, or services. It deals with solving practical problems and generally employs empirical methodologies.

The inventioneer starts with basic science, which is focused on advancing scientific theories and laws, and pulling from that basic foundation, uses the scientific method to discover practical applications and uses for the pure knowledge.

The IST doctoral program is intended for students in residency. Many of the courses involve participation in “hands-on” applied research and inventioneering. In addition to the applied research, it is a specific objective of this program to provide students with actual experience in entrepreneurial activities such as intellectual property development, managing teams, raising working capital, and developing marketing programs. Students graduating with this degree are in high demand for product development opportunities, managing research teams, and overseeing high-tech startups.

Majors:
- Applied Chemistry (Sc.D.)
- Applied Physics and Engineering (Sc.D.)
- Electrical Engineering and Computer Science (Sc.D.)
- Cyber Security (Sc.D.)
- E-Learning (Ed.D.)

DOCTORATE DEGREE REQUIREMENTS

Specialization
  - 30 graduate credits
Inventioneering
12 graduate credits

**Research Methodologies**
15 graduate credits

**Dissertation Research Project**
15 graduate credits

72 graduate credits after Bachelor’s

---

**Doctor of Science in Applied Chemistry**

**Program Description:** The IST Doctor of Science in Applied Chemistry degree program is for individuals interested in chemistry and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master advanced skills and knowledge of chemistry together with applied research methodologies and a survey of relevant entrepreneurial-related topics. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in applied chemistry research, product development, and services.

**Doctoral Program Educational Objectives**

- Mastery of advanced principles of chemistry, including computation and analytical tools.
- Familiarity of topics relevant to inventioneering and entrepreneurship, management, leadership, finance, and marketing.
- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.
- Creative application of chemistry principles and applied research to the solution of a broad range of commercial applications and career paths.
- Ability to professionally communicate concepts and programs of applied chemistry effectively, both orally and in writing.
- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

---

**APPLIED CHEMISTRY DEGREE PROGRAM OF STUDY**

**Applied Chemistry**

- CHEM611. Advanced Chemistry I (3 graduate credits)
- CHEM612. Advanced Chemistry II (3 graduate credits)
- CHEM617. Analytical Chemistry I (3 graduate credits)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM618</td>
<td>Analytical Chemistry II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM625</td>
<td>Solid State Materials Chemistry I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM626</td>
<td>Solid State Materials Chemistry II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM643</td>
<td>Classical Thermodynamics for Materials Science I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM644</td>
<td>Classical Thermodynamics for Materials Science II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM651</td>
<td>Pre-Dissertation Applied Research (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM652</td>
<td>Pre-Dissertation Applied Research (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM667</td>
<td>Chemical Kinetics and Reaction Dynamics I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM668</td>
<td>Chemical Kinetics and Reaction Dynamics II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM673</td>
<td>Catalysis and Kinetics I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM674</td>
<td>Catalysis and Kinetics II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM677</td>
<td>Advanced Analytical Chemistry I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM678</td>
<td>Advanced Analytical Chemistry II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM681</td>
<td>MATLAB I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>CHEM682</td>
<td>MATLAB II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN611</td>
<td>Entrepreneurship I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN612</td>
<td>Entrepreneurship II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN615</td>
<td>Innovation and Entrepreneurship I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN616</td>
<td>Innovation and Entrepreneurship II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN627</td>
<td>Organizational Behavior I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN628</td>
<td>Organizational Behavior II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN633</td>
<td>Management I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN634</td>
<td>Management II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN637</td>
<td>Key Management Models I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN638</td>
<td>Key Management Models II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN645</td>
<td>Leadership I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN646</td>
<td>Leadership II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN651</td>
<td>Inventioneering (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN652</td>
<td>Inventioneering (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN663</td>
<td>Intellectual Property I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN664</td>
<td>Intellectual Property II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN667</td>
<td>Entrepreneurial Finance I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN668</td>
<td>Entrepreneurial Finance II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN671</td>
<td>Marketing for Entrepreneurs I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN672</td>
<td>Marketing for Entrepreneurs II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN675</td>
<td>Search Engine Optimization I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN676</td>
<td>Search Engine Optimization II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN687</td>
<td>Google Ads I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>INVN688</td>
<td>Google Ads II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>RESM610</td>
<td>Literature Review (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>RESM611</td>
<td>Research Design (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>RESM628</td>
<td>Research Methods I (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>RESM629</td>
<td>Research Methods II (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>RESM630</td>
<td>Research Methods III (3 graduate credits)</td>
<td></td>
</tr>
<tr>
<td>RESM631</td>
<td>Research Methods IV (3 graduate credits)</td>
<td></td>
</tr>
</tbody>
</table>
RESM645. Applied Research Proposals (3 graduate credits)
*RESM663. Technical Writing and Publishing (3 graduate credits)
RESM691. Professional Skills and Ethics (3 graduate credits)
*RESM692. Foundations of Research (3 graduate credits)

Dissertation Research 15 graduate credits
*DISS698. Directed Dissertation Research I (7 graduate credits)
*DISS699. Directed Dissertation Research II (8 graduate credits)

TOTAL 72 graduate credits

Learning Outcomes

1. The ability to apply advanced principles of chemistry, including chemical computation and analytical tools, reaction kinetics, thermodynamics, materials, catalysts, and laboratory procedures.
2. An understanding of topics relevant to inventioneering, entrepreneurship, management, leadership, finance, and marketing.
3. The ability to find creative new technological ideas and create value from them through applied research.
4. The ability to communicate applied chemistry concepts effectively and professionally, both orally and in writing.
5. The ability to implement a creative application of basic principles of chemistry and applied research to the solution of a commercial application.

* Required courses

Doctor of Science in Applied Physics and Engineering

Program Description: The IST Doctor of Science in Applied Physics and Engineering degree program is for individuals interested in physics and engineering and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master advanced skills and knowledge of physics and engineering together with applied research methodologies and a survey of relevant entrepreneurial-related topics. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in applied physics and engineering research, product development, and services.

Doctoral Program Educational Objectives

• Mastery of advanced principles of physics, including computational tools.

• Familiarity of topics relevant to inventioneering and entrepreneurship, management, leadership, finance, and marketing.
• Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

• Creative application of principles of physics and engineering and applied research to the solution of a broad range of commercial applications and career paths.

• Ability to professionally communicate concepts and programs of applied physics and engineering effectively, both orally and in writing.

• Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**APPLIED PHYSICS AND ENGINEERING DEGREE PROGRAM OF STUDY**

**Applied Physics and Engineering**

30 graduate credits

- PHYS613. Advanced Classical Mechanics I (3 graduate credits)
- PHYS614. Advanced Classical Mechanics II (3 graduate credits)
- PHYS623. Electrodynamics I (3 graduate credits)
- PHYS624. Electrodynamics II (3 graduate credits)
- PHYS641. Modern Classical Physics I (3 graduate credits)
- PHYS642. Modern Classical Physics II (3 graduate credits)
- PHYS651. Pre-Dissertation Applied Research (3 graduate credits)
- PHYS652. Pre-Dissertation Applied Research (3 graduate credits)
- PHYS661. Astronomy I (3 graduate credits)
- PHYS662. Astronomy II (3 graduate credits)
- PHYS677. Gravitation I (3 graduate credits)
- PHYS678. Gravitation II (3 graduate credits)
- PHYS681. MATLAB I (3 graduate credits)
- PHYS682. MATLAB II (3 graduate credits)

**Inventioneering**

12 graduate credits

- INVN611. Entrepreneurship I (3 graduate credits)
- INVN612. Entrepreneurship II (3 graduate credits)
- INVN615. Innovation and Entrepreneurship I (3 graduate credits)
- INVN616. Innovation and Entrepreneurship II (3 graduate credits)
- INVN627. Organizational Behavior I (3 graduate credits)
- INVN628. Organizational Behavior II (3 graduate credits)
- INVN633. Management I (3 graduate credits)
- INVN634. Management II (3 graduate credits)
- INVN637. Key Management Models I (3 graduate credits)
- INVN638. Key Management Models II (3 graduate credits)
- INVN645. Leadership I (3 graduate credits)
- INVN646. Leadership II (3 graduate credits)
- INVN651. Inventioneering (3 graduate credits)
INVN652. Inventioneering (3 graduate credits)
INVN663. Intellectual Property I (3 graduate credits)
INVN664. Intellectual Property II (3 graduate credits)
INVN667. Entrepreneurial Finance I (3 graduate credits)
INVN668. Entrepreneurial Finance II (3 graduate credits)
INVN671. Marketing for Entrepreneurs I (3 graduate credits)
INVN672. Marketing for Entrepreneurs II (3 graduate credits)
INVN675. Search Engine Optimization I (3 graduate credits)
INVN676. Search Engine Optimization II (3 graduate credits)
INVN687. Google Ads I (3 graduate credits)
INVN688. Google Ads II (3 graduate credits)

Research Methodologies  15 graduate credits

RESM610. Literature Review (3 graduate credits)
RESM611. Research Design (3 graduate credits)
RESM628. Research Methods I (3 graduate credits)
RESM629. Research Methods II (3 graduate credits)
RESM630. Research Methods III (3 graduate credits)
RESM631. Research Methods IV (3 graduate credits)
RESM645. Applied Research Proposals (3 graduate credits)
*RESM663. Technical Writing and Publishing (3 graduate credits)
RESM691. Professional Skills and Ethics (3 graduate credits)
*RESM692. Foundations of Research (3 graduate credits)

Dissertation Research  15 graduate credits

*DISS698. Directed Dissertation Research I (7 graduate credits)
*DISS699. Directed Dissertation Research II (8 graduate credits)

TOTAL  72 graduate credits

Learning Outcomes

1. The ability to apply advanced principles of physics, including electrodynamics; thermodynamics; astronomy; quantum and nuclear physics; gravitation and spacetime; and computational tools.
2. An understanding of topics relevant to inventioneering, entrepreneurship, management, leadership, finance, and marketing.
3. The ability to find creative new technological ideas and create value from them through applied research.
4. The ability to communicate applied physics and engineering concepts effectively and professionally, both orally and in writing.
5. The ability to implement a creative application of principles of physics and engineering and applied research to the solution of a commercial application.

* Required courses
Doctor of Science in Electrical Engineering and Computer Science

Program Description: The IST Doctor of Science in Electrical Engineering and Computer Science degree program is for individuals interested in electrical engineering and computer science and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master advanced skills and knowledge of electrical engineering and computer science together with applied research methodologies and a survey of relevant entrepreneurial-related topics. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in electrical engineering and computer science research, product development, and services.

Doctoral Program Educational Objectives

• Mastery of advanced principles of computer science, including digital design, computer architecture, artificial intelligence, data analytics, machine learning and computational tools.

• Familiarity of topics relevant to inventioneering and entrepreneurship, management, leadership, finance, and marketing.

• Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

• Creative application of electrical engineering and computer science principles and applied research to the solution of a broad range of commercial applications and career paths.

• Ability to professionally communicate concepts and programs of electrical engineering and computer science effectively, both orally and in writing.

• Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE DEGREE PROGRAM OF STUDY

Electrical Engineering and Computer Science 30 graduate credits

EECS617. Circuit Design I (3 graduate credits)
EECS618. Circuit Design II (3 graduate credits)
EECS625. Digital Design and Computer Architecture I (3 graduate credits)
EECS626. Digital Design and Computer Architecture II (3 graduate credits)
EECS631. IoT I (3 graduate credits)
EECS632. IoT II (3 graduate credits)
EECS647. Logic Design with Verilog I (3 graduate credits)
EECS648. Logic Design with Verilog II (3 graduate credits)
EECS651. Pre-Dissertation Applied Research (3 graduate credits)
EECS652. Pre-Dissertation Applied Research (3 graduate credits)
EECS665. Artificial Intelligence I (3 graduate credits)
EECS666. Artificial Intelligence II (3 graduate credits)
EECS673. Big Data Analytics for Cloud, IoT, and Cognitive Learning I (3 graduate credits)
EECS674. Big Data Analytics for Cloud, IoT, and Cognitive Learning II (3 graduate credits)
EECS677. Machine Learning I (3 graduate credits)
EECS678. Machine Learning II (3 graduate credits)
EECS681. MATLAB I (3 graduate credits)
EECS682. MATLAB II (3 graduate credits)

Inventioneering 12 graduate credits

INVN611. Entrepreneurship I (3 graduate credits)
INVN612. Entrepreneurship II (3 graduate credits)
INVN615. Innovation and Entrepreneurship I (3 graduate credits)
INVN616. Innovation and Entrepreneurship II (3 graduate credits)
INVN627. Organizational Behavior I (3 graduate credits)
INVN628. Organizational Behavior II (3 graduate credits)
INVN633. Management I (3 graduate credits)
INVN634. Management II (3 graduate credits)
INVN637. Key Management Models I (3 graduate credits)
INVN638. Key Management Models II (3 graduate credits)
INVN645. Leadership I (3 graduate credits)
INVN646. Leadership II (3 graduate credits)
INVN651. Inventioneering (3 graduate credits)
INVN652. Inventioneering (3 graduate credits)
INVN663. Intellectual Property I (3 graduate credits)
INVN664. Intellectual Property II (3 graduate credits)
INVN667. Entrepreneurial Finance I (3 graduate credits)
INVN668. Entrepreneurial Finance II (3 graduate credits)
INVN671. Marketing for Entrepreneurs I (3 graduate credits)
INVN672. Marketing for Entrepreneurs II (3 graduate credits)
INVN675. Search Engine Optimization I (3 graduate credits)
INVN676. Search Engine Optimization II (3 graduate credits)
INVN687. Google Ads I (3 graduate credits)
INVN688. Google Ads II (3 graduate credits)

Research Methodologies 15 graduate credits

RESM610. Literature Review (3 graduate credits)
RESM611. Research Design (3 graduate credits)
RESM628. Research Methods I (3 graduate credits)
RESM629. Research Methods II (3 graduate credits)
RESM630. Research Methods III (3 graduate credits)
RESM631. Research Methods IV (3 graduate credits)
RESM645. Applied Research Proposals (3 graduate credits)
*RESM663. Technical Writing and Publishing (3 graduate credits)
RESM691. Professional Skills and Ethics (3 graduate credits)
*RESM692. Foundations of Research (3 graduate credits)

Dissertation Research 15 graduate credits
*DISS698. Directed Dissertation Research I (7 graduate credits)
*DISS699. Directed Dissertation Research II (8 graduate credits)

TOTAL 72 graduate credits

Learning Outcomes

1. The ability to apply advanced principles of computer science, including digital design, computer architecture, artificial intelligence, data analytics, machine learning and computational tools.
2. An understanding of topics relevant to inventioneering, entrepreneurship, management, leadership, finance, and marketing.
3. The ability to find creative new technological ideas and create value from them through applied research.
4. The ability to communicate electrical engineering and computer science concepts effectively and professionally, both orally and in writing.
5. The ability to implement a creative application of basic principles of electrical engineering and computer science and applied research to the solution of a commercial application.

* Required courses

Doctor of Science in Cyber Security

Program Description: The IST Doctor of Science in Cyber Security degree program is for individuals interested in cyber security and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling students to master advanced skills and knowledge of cyber security together with applied research methodologies and a survey of relevant entrepreneurial-related topics. Building upon this foundation, students are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in cyber security research, product development, and services.

Doctoral Program Educational Objectives

• Mastery of advanced principles of cyber security, including best practices, threat avoidance, incident response penetration testing, secure authentication, end-to-end data encryption, and cryptography.

• Familiarity of topics relevant to inventioneering and entrepreneurship, management, leadership, finance, and marketing.
- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

- Creative application of cyber security principles and applied research to the solution of a broad range of commercial applications and career paths.

- Ability to professionally communicate concepts and programs of cyber security effectively, both orally and in writing.

- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

**CYBER SECURITY DEGREE PROGRAM OF STUDY**

**Cyber Security**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYBR615</td>
<td>Applied Incident Response I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR616</td>
<td>Applied Incident Response II</td>
<td>3</td>
</tr>
<tr>
<td>CYBR627</td>
<td>Advanced Cyber Security Policies I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR628</td>
<td>Advanced Cyber Security Policies II</td>
<td>3</td>
</tr>
<tr>
<td>CYBR645</td>
<td>Cybersecurity Analyst I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR646</td>
<td>Cybersecurity Analyst II</td>
<td>3</td>
</tr>
<tr>
<td>CYBR651</td>
<td>Pre-Dissertation Applied Research</td>
<td>3</td>
</tr>
<tr>
<td>CYBR652</td>
<td>Pre-Dissertation Applied Research</td>
<td>3</td>
</tr>
<tr>
<td>CYBR663</td>
<td>Advanced Penetration Testing I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR664</td>
<td>Advanced Penetration Testing II</td>
<td>3</td>
</tr>
<tr>
<td>CYBR675</td>
<td>Industrial Cyber Security I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR676</td>
<td>Industrial Cyber Security II</td>
<td>3</td>
</tr>
<tr>
<td>CYBR683</td>
<td>Real-World Cryptography I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR684</td>
<td>Real-World Cryptography II</td>
<td>3</td>
</tr>
<tr>
<td>CYBR688</td>
<td>Certified Information Systems Security Professional I</td>
<td>3</td>
</tr>
<tr>
<td>CYBR689</td>
<td>Certified Information Systems Security Professional II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Inventioneering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVN611</td>
<td>Entrepreneurship I</td>
<td>3</td>
</tr>
<tr>
<td>INVN612</td>
<td>Entrepreneurship II</td>
<td>3</td>
</tr>
<tr>
<td>INVN615</td>
<td>Innovation and Entrepreneurship I</td>
<td>3</td>
</tr>
<tr>
<td>INVN616</td>
<td>Innovation and Entrepreneurship II</td>
<td>3</td>
</tr>
<tr>
<td>INVN627</td>
<td>Organizational Behavior I</td>
<td>3</td>
</tr>
<tr>
<td>INVN628</td>
<td>Organizational Behavior II</td>
<td>3</td>
</tr>
<tr>
<td>INVN633</td>
<td>Management I</td>
<td>3</td>
</tr>
<tr>
<td>INVN634</td>
<td>Management II</td>
<td>3</td>
</tr>
<tr>
<td>INVN637</td>
<td>Key Management Models I</td>
<td>3</td>
</tr>
<tr>
<td>INVN638</td>
<td>Key Management Models II</td>
<td>3</td>
</tr>
<tr>
<td>INVN645</td>
<td>Leadership I</td>
<td>3</td>
</tr>
<tr>
<td>INVN646</td>
<td>Leadership II</td>
<td>3</td>
</tr>
</tbody>
</table>
INVN651. Inventioneering (3 graduate credits)
INVN652. Inventioneering (3 graduate credits)
INVN663. Intellectual Property I (3 graduate credits)
INVN664. Intellectual Property II (3 graduate credits)
INVN667. Entrepreneurial Finance I (3 graduate credits)
INVN668. Entrepreneurial Finance II (3 graduate credits)
INVN671. Marketing for Entrepreneurs I (3 graduate credits)
INVN672. Marketing for Entrepreneurs II (3 graduate credits)
INVN675. Search Engine Optimization I (3 graduate credits)
INVN676. Search Engine Optimization II (3 graduate credits)
INVN687. Google Ads I (3 graduate credits)
INVN688. Google Ads II (3 graduate credits)

Research Methodologies 15 graduate credits
RESM610. Literature Review (3 graduate credits)
RESM611. Research Design (3 graduate credits)
RESM628. Research Methods I (3 graduate credits)
RESM629. Research Methods II (3 graduate credits)
RESM630. Research Methods III (3 graduate credits)
RESM631. Research Methods IV (3 graduate credits)
RESM645. Applied Research Proposals (3 graduate credits)
*RESM663. Technical Writing and Publishing (3 graduate credits)
RESM691. Professional Skills and Ethics (3 graduate credits)
*RESM692. Foundations of Research (3 graduate credits)

Dissertation Research 15 graduate credits
*DISS698. Directed Dissertation Research I (7 graduate credits)
*DISS699. Directed Dissertation Research II (8 graduate credits)

TOTAL 72 graduate credits

Learning Outcomes

1. The ability to apply advanced principles of cyber security, including best practices, threat avoidance, incident response penetration testing, secure authentication, end-to-end data encryption, and cryptography.
2. An understanding of topics relevant to inventioneering, entrepreneurship, management, leadership, finance, and marketing.
3. The ability to find creative new technological ideas and create value from them through applied research.
4. The ability to communicate cyber security concepts effectively and professionally, both orally and in writing.
5. The ability to implement a creative application of basic principles of cyber security and applied research to the solution of a commercial application.

* Required courses
Doctor of Education in E-Learning

Program Description: The IST Doctor of Education in E-Learning degree program is for individuals interested in e-learning and desiring the ability to apply this understanding to make positive contributions to society. Courseware is provided enabling participants in this program to master advanced skills and knowledge of e-learning together with applied research methodologies and a survey of relevant entrepreneurial-related topics. Building upon this foundation, participants are taught the core principles and methodologies of inventioneering and applied research preparing them for careers in e-learning research, product development, and services.

Doctoral Program Educational Objectives

- Mastery of advanced principles of e-learning, including asynchronous teaching online, multimedia learning principles, instructional design, learning theories, and best practices for student motivation in distance learning environments.

- Familiarity of topics relevant to inventioneering and entrepreneurship, management, leadership, finance, and marketing.

- Ability to carry out applied research projects targeting commercial goals and objectives, and with consideration of economic outcomes, marketability, safety, and environmental considerations while maintaining the highest standards of ethical practice.

- Creative application of e-learning principles and applied research to the solution of a broad range of commercial applications and career paths.

- Ability to professionally communicate concepts and programs of e-learning effectively, both orally and in writing.

- Recognition of and commitment to the importance of continued self-improvement and the ability to engage in lifelong learning.

E-LEARNING DEGREE PROGRAM OF STUDY

E-Learning

ELRN611. Distance Learning I (3 graduate credits)
ELRN612. Distance Learning II (3 graduate credits)
ELRN621. E-Learning and the Science of Instruction I (3 graduate credits)
ELRN622. E-Learning and the Science of Instruction II (3 graduate credits)
ELRN633. Strategies for Boosting Cognitive Engagement I (3 graduate credits)
ELRN634. Strategies for Boosting Cognitive Engagement II (3 graduate credits)
ELRN651. Pre-Dissertation Applied Research (3 graduate credits)
ELRN652. Pre-Dissertation Applied Research (3 graduate credits)
ELRN667. Designing Effective Instruction I (3 graduate credits)
ELRN668. Designing Effective Instruction II (3 graduate credits)
ELRN671. Paths of Student Engagement I (3 graduate credits)
ELRN672. Paths of Student Engagement II (3 graduate credits)
ELRN675. The Science of Learning I (3 graduate credits)
ELRN676. The Science of Learning II (3 graduate credits)
ELRN685. Learning Theories I (3 graduate credits)
ELRN686. Learning Theories II (3 graduate credits)

**Inventioneering**

12 graduate credits

INVN611. Entrepreneurship I (3 graduate credits)
INVN612. Entrepreneurship II (3 graduate credits)
INVN615. Innovation and Entrepreneurship I (3 graduate credits)
INVN616. Innovation and Entrepreneurship II (3 graduate credits)
INVN627. Organizational Behavior I (3 graduate credits)
INVN628. Organizational Behavior II (3 graduate credits)
INVN633. Management I (3 graduate credits)
INVN634. Management II (3 graduate credits)
INVN637. Key Management Models I (3 graduate credits)
INVN638. Key Management Models II (3 graduate credits)
INVN645. Leadership I (3 graduate credits)
INVN646. Leadership II (3 graduate credits)
INVN651. Inventioneering (3 graduate credits)
INVN652. Inventioneering (3 graduate credits)
INVN663. Intellectual Property I (3 graduate credits)
INVN664. Intellectual Property II (3 graduate credits)
INVN667. Entrepreneurial Finance I (3 graduate credits)
INVN668. Entrepreneurial Finance II (3 graduate credits)
INVN671. Marketing for Entrepreneurs I (3 graduate credits)
INVN672. Marketing for Entrepreneurs II (3 graduate credits)
INVN675. Search Engine Optimization I (3 graduate credits)
INVN676. Search Engine Optimization II (3 graduate credits)
INVN687. Google Ads I (3 graduate credits)
INVN688. Google Ads II (3 graduate credits)

**Research Methodologies**

15 graduate credits

RESM610. Literature Review (3 graduate credits)
RESM611. Research Design (3 graduate credits)
RESM628. Research Methods I (3 graduate credits)
RESM629. Research Methods II (3 graduate credits)
RESM630. Research Methods III (3 graduate credits)
RESM631. Research Methods IV (3 graduate credits)
*RESM645. Applied Research Proposals (3 graduate credits)
*RESM663. Technical Writing and Publishing (3 graduate credits)
RESM691. Professional Skills and Ethics (3 graduate credits)
*RESM692. Foundations of Research (3 graduate credits)

**Dissertation Research**

15 graduate credits

*DISS698. Directed Dissertation Research I (7 graduate credits)
**DISS699. Directed Dissertation Research II (8 graduate credits)**

| TOTAL | 72 graduate credits |

Learning Outcomes

1. The ability to apply advanced principles of e-learning, including asynchronous teaching online, multimedia learning principles, instructional design, learning theories, and best practices for student motivation in distance learning environments.

2. An understanding of topics relevant to inventioneering, entrepreneurship, management, leadership, finance, and marketing.

3. The ability to find creative new technological ideas and create value from them through applied research.

4. The ability to communicate e-learning concepts effectively and professionally, both orally and in writing.

5. The ability to implement a creative application of basic principles of e-learning and applied research to the solution of a commercial application.

* Required courses
Full-time Faculty

Dr. Thomas Czerkawski
B.A. in Theatre Performance – Auburn University
M.A. in Theatre Literature, History and Criticism – University of Missouri - Kansas City
Ed.D. in E-Learning – Institute of Science & Technology

Dr. Eileen Dayton
B.A. in Humanities – University of Minnesota
Doctor of Research, E-Learning – Institute of Science and Technology

Dr. Roger Billings
Bachelor’s in Chemistry, Physics, and Engineering – Brigham Young University
Doctor of Research, Applied Science Engineering – Institute of Science and Technology
Postdoctoral study, Applied Cybersecurity – Massachusetts Institute of Technology

Dr. John Billings
B.S. in Electrical Engineering and Computer Science – Institute of Science and Technology
Doctor of Research, Cyber Security – Institute of Science and Technology
Postdoctoral study, Applied Cybersecurity – Massachusetts Institute of Technology

Dr. Thomas Eyre
B.S. in Electrical Engineering and Computer Science – Institute of Science and Technology
Doctor of Research, EE and Computer Science – Institute of Science and Technology

Dr. Ginger Hovenic
B.A. in Education – San Diego State University
M.A. in Educational Leadership – United States International University
Ed.D. in Educational Leadership – United States International University
Teaching Fellow – Harvard University
Fellow – George Lucas Educational Foundation

Dr. Maria Sanchez
B.S. in Chemical Engineering
Doctor of Research, Applied Chemistry
Dr. Ross M. Stites
B.S. in Electrical Engineering – Kansas State University
M.S. in Electrical Engineering – Kansas State University
Ph.D. in Electrical Engineering – University of Minnesota

Dr. John Strickler
B.M. in Music Education – University of Wisconsin – Madison
M.M. in Conducting – University of Southern California
Ph.D. in Music Theory – University of Southern California

Dr. David Whipple
B.S. in Law Enforcement – Weber State College – Ogden
M.S. in Logistics – Florida Institute of Technology – Melbourne
Ph.D. in Information Assurance and Security – Capella University
Certificate in Cybersecurity: Managing Risk in the Information Age – Harvard University

Adjunct Faculty

Dr. Rachael Rehage
B.A. in History – University of Redlands
M.A. in Curriculum and Instruction – University of Redlands
Ed.D. in Leadership for Educational Justice – University of Redlands

Dr. Anissa Reilly
B.A. in Theater – Morgan State University
M.Ed. in Supervision and Administration – Principals Institute, Bank Street College of Education
Ed.D. in Educational Leadership – Sage Colleges
Admissions

IST’s Admissions Department is available to provide assistance and guidance to prospective students during the application process. This includes providing information regarding the undergraduate and graduate program degrees offered and application procedures.

Non-Discrimination Policy:

The Institute of Science and Technology does not discriminate based on ethnicity, gender, national origin, sexual orientation, race, religion, disability, or age in its programs and activities. The President has been designated to handle inquiries regarding the non-discrimination policies:

Office of the President
11020 N Ambassador Drive, Kansas City, MO 64153
(816) 235-3500

Academic Calendar/Year-Round Enrollment/Start and End Dates:

Students are allowed to begin their self-paced studies at IST throughout the calendar year. The 15-week semester is based on rolling enrollment and the semester starts when the admitted student begins their program, which could be any day of the year after all registration requirements have been met.

Admissions Criteria:

Candidates demonstrating quality academic ability, good moral character, personal integrity, and the determination to complete a rigorous program in the applied sciences are considered for admission to the Institute of Science and Technology (IST). Students must also meet all other general and specific degree program admission requirements on the IST website.

English Language Requirement (TOEFL): Students are expected to communicate clearly in writing and during conversations with faculty and staff. If English is not a student's native language, but they have attended school in an English-speaking environment they can provide documentation of such or they must submit proof of a qualifying score on the Internet-based Test of English as a Foreign Language (TOEFL iBT). IST requires a qualifying score of 80 or higher. The TOEFL iBT tests the four language skills that are important for effective communication: speaking, listening, reading, and writing. Access the TOEFL iBT Information and Registration Bulletin (opens new window) for information about test dates, locations, and fees.

When admitting a student, IST may consider the student's standing at a previously attended institution, including, but not limited to, records of disciplinary action.

Undergraduate Program:

To be considered for admission into the undergraduate degree program, applicants must possess a high school diploma or its equivalent. Depending upon the program of interest, other specific admission requirements may also apply.
Steps to Enrollment:

- Complete IST’s online application
- Provide a current government-issued photo ID.
- Provide evidence of a high school diploma or its equivalent (e.g., GED). A transcript may be used to provide evidence of high school completion provided that a graduation date is listed.

Graduate Program:

Steps to Enrollment:

- Complete IST’s online application
- Provide a current government-issued photo ID.
- Master's Applicants: Provide evidence of a Bachelor’s degree from an accredited institution (e.g., transcript).
- Doctoral Applicants: Provide evidence of a Bachelor's or Master's degree from an accredited institution.
- Have a grade point average of 3.0 or better in the last 60 hours of undergraduate work or last two years as a full-time undergraduate or graduate student.
- If English is not the first language, provide evidence of proficiency in the English Language or documentation of attending and succeeding in an English language taught school.

Transcripts must be received by IST before students are allowed to complete the enrollment process. Foreign transcripts, not in English, must be submitted together with certified English translations. For Foreign Transcript evaluation the student will be responsible for costs related to the evaluation procedures. Contact the Admissions Department. admissions@science.edu for further assistance.

During the application process, instructions are provided for how to submit transcripts and other required documentation.

Selection of Candidates:

Applicants are selected by an Institute of Science and Technology review committee. Selection is based upon current program enrollment caps, intellectual abilities of the student as demonstrated by their GPA, and/or on the opinion of the Committee concerning the student's ability to succeed – not only in the Program, but also in the field after the degree is awarded.

Notification of Admission/Denial:

Applicants will be notified in writing as to acceptance or denial. Notification typically occurs within 30 days from the date of the application but may take longer in some circumstances.

Transfer Credit Policy:

Transcripts from accredited programs previously attended will be evaluated and credit may be given for courses completed if all other admission requirements have been met.
Undergraduate Program Transfer Credit Policy:

IST may accept transfer credits up to a maximum of 50% of the required credits for a bachelor’s or associate degree program. Students must be enrolled in IST for a minimum of two years in order to qualify for graduation. For any courses critical to the student’s major, a Proficiency Exam and Review must be completed if the course is not taken through IST. Course grades must be C- or higher to be accepted for transfer. If any credits were earned more than 10 years ago, the credit will not be transferable.

Graduate Program Transfer Credit Policy:

IST does not accept transfer credits for its master’s or doctoral degree programs.

Completed Courses or a Degree

If students hold an Associate of Arts (AA), Associate of Science (AS), or Associate of Applied Science (AAS) from an institution that is nationally or regionally accredited by an agency recognized by the U.S. Department of Education, they should clear most of the lower-division general education requirements for a bachelor’s degree from IST.

Acceptance of Transfer Credits

The acceptance of transfer credits lies within the sole discretion of IST. Credits earned at other institutions may or may not be accepted by IST. Likewise, credits earned at IST may or may not be accepted by another institution depending upon its own programs, policies, and regulations.

Students planning to complete credits for a graduate degree in another college, university, or graduate school are advised to contact the Admissions Office of such institution in advance of applying.

International Applicants

An international applicant is defined as any student applying to IST who is not a U.S. citizen or permanent resident. International students will be considered using the same criteria as all other incoming students including the English language requirement with the addition of a photocopy of the name page of the applicant’s passport or government issued photo identification or national identity card with photo.

Special Student Applicants

Special students are those who by permission of the Admissions Office are admitted to certain courses without being required to satisfy all entrance requirements or carry the number of courses prescribed for regular students.

Readmission Applicants

Students interrupting their educational programs by not enrolling in any subsequent semester must submit an application for readmission to the Admissions Office. When additional coursework
has been completed at other institutions, official transcripts must be submitted. Readmissions must be approved by the Registrar's Office.

Technology Requirements for All Students

To participate in IST courses, students will need a computer with Microsoft Office software and Internet access. The majority of the coursework will be completed online through a web browser. Although Android and iOS tablets may be used to access online course materials, we recommend that students have a computer that meets the following minimum requirements.

Minimum Hardware and Operating System:

- 1.8 GHz Intel Core 2 Duo or greater
- 2 GB RAM or more & 1 GB of free hard drive space or more
- If running Windows, Windows 10 or greater
- If running macOS, macOS 10.12 or greater
- Web camera, microphone, and speakers (your computer may already have this built-in)

Software:

- Latest version of Safari, Google Chrome, Edge, or Firefox
- MS Word 2010 or higher or a word processor that can create files with any of the following extensions: .docx (MS Word 2010 or higher), or a standard .rtf (rich text format)
- PDF Reader (current version)

Internet Connection:

- A reliable broadband Internet connection, either cable or DSL, of at least 2.5Mbps download speed (constant) for adequate audio and video quality.
- As of January 2020, Internet Explorer is no longer supported for certain platforms.
- An email address that will accept all emails, including attachments, from the domain name science.edu.

Minimum Computer Skills Required

- Ability to download and install files from the Internet.
- Knowledge in navigating the Internet.
- Proficient in use of search engines for research.
- Ability to send and receive email with attachments to correspond.
- File management skills: copy files from a flash drive or the Internet to a specific directory on the hard drive.
- Word processing skills such as: how to create files, open files, save files, print files, export to PDF, and edit documents.

Note: Students are presumed to receive the messages sent to designated email addresses. It is the responsibility of the student to ensure that messages from IST are not blocked and that the mailbox is not too full to receive messages.
Enrollment Cancellation Policy

The Institute of Science and Technology reserves the right to cancel the enrollment of any student with or without cause. Conditions that would typically lead to cancellation include the following:

- The student wishes to withdraw from the Program.
- The student fails a class in the Program. (The student may re-take the class if once failed. However, if twice failed, the student may be automatically suspended from the Program. The suspension may be waived, however, if the student requests such in writing, at the discretion of the President.)
- The student fails to attend classes or meet other responsibilities pertaining to the Program.
- The student is found to use, possess, or dispense illegal drugs.
- The student is involved in theft or other dishonest behavior.
- The student is involved in inappropriate moral behavior.
- The student is found to be in violation of the law.

Tuition and Fees

Tuition Scholarships

IST has a limited number of scholarships to cover the full-tuition expenses to earn a degree. At this time, only students that meet the criteria for a full-tuition scholarship will be admitted to IST. Failure to meet GPA standards in any given term can result in termination of a scholarship, in which case the student would be withdrawn from the program. Awards are limited to tuition-only and will not cover student expenses for books, a student computer, or other education-related expenses.

Financial Assistance Policy

The Institute of Science and Technology is dedicated to providing the best possible education and service to our students. A complete understanding of financial responsibilities is an essential element of a student’s education. IST’s Student Services Department is committed to assisting students all student account needs. However, students have the primary responsibility to ensure their tuition is paid on time each term according to their agreement with the Institute.

Tuition for the full term is due by the 1st day the student begins their term. Acceptance of term registration confirms agreement to pay tuition in full.

Payment Methods

IST accepts credit/debit cards (Visa, MasterCard, Discover, and American Express) and PayPal.

Financial Aid
IST does not offer federal Title IV student aid. Students may apply for an IST scholarship to cover the tuition expenses for earning a degree from IST.

**Refunds and Cancellation**

Students with a withdrawal date up through the completion of 60% of a semester are eligible for a refund of a prorated portion of tuition. Students with a withdrawal date occurring after 60% of the semester is completed are not eligible for a refund. Additional applicable fees will not be refunded. Tuition is paid by semester and not by course. Any refunds calculated will be based upon total withdrawal from the semester. Dropping an individual course during a semester would not constitute a refund.

**Right to Withdraw and Determining Withdrawal Dates**

Students wishing to withdraw during a semester and request a refund may do so by contacting the Student Services office and requesting a withdrawal form, if applicable. Withdrawal dates are determined in two ways, either through student-initiated withdrawal (official) or through administrative withdrawal (unofficial).

Student-initiated withdrawal occurs when the student notifies the Student Services office of the intent to withdraw. Administrative withdrawal occurs when IST determines that students are no longer enrolled based on a variety of reasons such as lack of academic activity, failure to establish enrollment at the beginning of a new term, or failure to pay tuition.

- **Student-initiated withdrawals:** The withdrawal date is the date the student notifies the Institute of the intent to withdraw.

- **Administrative withdrawals:** The withdrawal date is the last date of student academic activity.

Students who withdraw within seven (7) days of the start date of the semester will receive a full refund of the semester tuition (including applicable taxes) paid to IST. Students requesting withdrawal during subsequent weeks from their semester start date are entitled to the amounts listed in the chart below for a 15-week semester.

**Refundable Tuition Due to Student based on the semester start date:**

In the event that a student cancels their enrollment during a semester, the following refund schedule is used to calculate a refund amount (if any) for tuition paid toward the semester during which the student cancelled.

- 100% For anytime between 1 day and 7 days after the semester start date.
- 80% For anytime between 8 days and 14 days after the semester start date.
- 70% For anytime between 15 days and 21 days after the semester start date.
- 60% For anytime between 22 days and 28 days after the semester start date.
- 50% For anytime between 29 days and 35 days after the semester start date.
- 40% For anytime between 36 days and 42 days after the semester start date.
- 30% For anytime between 43 days and 49 days after the semester start date.
- 20% For anytime between 50 days and 56 days after the semester start date.
10% For anytime between 57 days and 63 days after the semester start date.

No refunds will be made after the 9th week (or more than 63 days) after the start of the semester.

If the Institute has collected money from a student for transmittal on the student’s behalf to a third party for a bond, library usage, or fees for a license, application, or examination and the Institute has not paid the money to the third party at the time of the student's request for refund, the Institute shall refund the money to the student within 30 days of receipt of the student's refund request.

Calculating Refunds

Students who withdraw before completing 60% of a semester (the number of calendar days from the official term start date to the withdrawal date, divided by the total number of calendar days in the semester), are eligible for a prorated refund of tuition. The amount of the tuition refund is calculated using the refundable tuition sliding scale above. For example, a student who withdraws after 4 weeks through a semester and has paid $5,000 of a $5,000 total tuition charge would be entitled to a pro-rated 50% refund of $2,500 ($5,000 * 50% = $2,500).

Refund Timeline

Once eligibility for a refund is calculated, the Financial Services office processes tuition charges and refunds within 30 days, as applicable.

Any funds refunded to a student are refunded via the original payment method, i.e., tuition paid by credit card is refunded by credit card (less nonrefundable convenience fee).

All funding sources including scholarships, both internal and external, waivers, discounts and grants will be reviewed and may be subject to a proration calculation. In the case of third-party funds, i.e., employer contributions, government funding, military payments, etc., if the payment exceeds tuition and fees, IST will follow any instructions provided by the original payer for the appropriate handling of the refund. If no instructions are provided, the refund will be processed to the original payer. Students are responsible for any portion of the tuition and fees owed, after refunds to all payers.

Tuition Appeal

In the case of exceptional circumstances where students are not entitled to a refund under the policies outlined above, students may make an appeal for tuition considerations by submitting a written explanation of circumstances that warrant an exception to the published refund policy. Exceptional circumstances might include incapacitating illness or injury. Supporting documentation to verify exceptional circumstances is required. Disciplinary action imposed on a student due to violations of the Code of Student Conduct is not considered valid grounds for tuition appeal. All appeals are sent to Student Services at studentservices@science.edu. If the student is deemed eligible for a refund, the Financial Services office processes tuition charges and refunds within 30 days, as applicable.

Funds reimbursed to students are reimbursed via the original payment method; i.e., payments received via credit card are refunded (less non-refundable convenience fee) to the card used for payment.
Billing and Account Statements

A student account billing notice is generated each time a charge is applied to a student account. Billing notices are delivered to the student email accounts.

Past Due Accounts

Tuition for the full term is due by the first day of each student’s term. Any student account for reasons other than tuition not paid in full is past due on the second day of the term. Past due accounts may be placed on financial hold for non-payment. Failure to complete payment or payment arrangements with IST or make payment in full may result in administrative withdrawal.

In addition, delinquent accounts may be referred to a collection agency. Students are responsible for additional late payment charges, interest, attorney's fees, other reasonable costs, and charges necessary for the collection of any amount not paid when due.

Student Services

The primary role of the Student Services office includes scheduling students, monitoring academic progress, and informing students of IST policies and procedures to support the student through program completion and graduation. The Student Services office is available to assist students with general questions and administrative or accessibility issues.

The Student Services team helps students resolve technical issues, listens to student concerns, and makes recommendations for improving policy and practice based on student feedback. The Student Services team provides a formal means by which students can express their views, and those views in turn inform the decisions we make. Team members have the expertise to guide students toward goals and direct them to the resources they need to be successful.

To contact Student Services please email studentservices@science.edu. Inquiries received after hours are generally responded to the following business day.

Student Assistance Program

IST offers a voluntary, and confidential service which offers counseling and support services to students online. IST’s Social Emotional Learning courses focus on important issues students of today are facing. The Crisis Intervention Lessons provides support as student face challenging issues, such as divorce, death of a loved one, bullying, natural disasters and more. This online student assistance program constitutes the extent of healthcare services available to IST students through the Institute.

Tools for Success

Students are given tools needed to reach out and network with peers and other students in the program by using their student ID. Students are able to interact and share ideas, suggestions and offer constructive feedback to concepts that are being discussed in the coursework.
Students also use the Science Information System where students can publish their work and receive feedback from their peers. This system provides the venue for students to share their research and peer review other science projects and innovations.

Commencement

A commencement ceremony is held in the spring at the IST facilities in Kansas City, Missouri each year. This is an important time to honor graduates’ accomplishments and celebrate with those family and friends that have been supportive during the student’s educational journey.

Alumni Services

IST’s Alumni Services department provides assistance to graduates to pursue additional endeavors. This includes supporting graduates in identifying potential employers and employment opportunities, preparing for the job pursuit process including resume review, leveraging professional social media and other online tools, and preparing for job interviews.

The Alumni Services department solicits feedback on where graduates are working, if they have continued their college education, if they opened their own business or anything else that may help in our efforts to support students during and after their program of study. The Alumni Relations team contact info is alumni@science.edu.

Please Note: IST does not guarantee job placement, advancement, or continued employment.

Financial Assistance Services

IST’s Financial Services department is available to assist students with financial matters related to their program of study. This includes guidance on potential funding or scholarship options, discussing student account transactions, and any other relevant financial information. IST students may be eligible for various types of financial assistance, depending on specific eligibility requirements for each funding type which can be discussed with the financial services staff.

Career and Placement Services

IST provides career assistance and resources to students and graduates. Career and Placement Development (CPD) Specialists are available to assist students and graduates on how to develop a career plan, implement job search strategies, and assist with the creation of marketing tools such as resumes, cover letters, and professional portfolio profiles such as LinkedIn.

The Career & Placement Department offers assistance and individual advising to students/graduates interested in continuing their education via graduate school. For additional information contact careerservices@science.edu.

Student Services Orientation

It is the student’s responsibility to attend the online Student Services Orientation session. IST provides information on Career and Placement services to all new students during Orientation. Students are invited to complete a voluntary survey regarding their career goals, current
employment status, and experience level. Students also receive all information regarding courseware navigation and requirements.

**Student Identity Verification**

IST complies with Federal Student Authentication Regulations requiring online institutions to implement processes that establish that the student who registers in an online course is the same student participating in, completing, and receiving academic credit for the course.

IST students must log into a secure portal to access the Learning Management System by entering a unique user ID and password. Without these identifiers, students are unable to access online courses and student support resources. IST’s policies regarding academic integrity and acceptable use of IST services include penalties for unauthorized use of another individual’s name and password and for engaging in academic dishonesty.

**Change of Contact Information**

Change of contact information must be provided to Student Services within five days of the change to keep the department up to date allowing for the best communication link with each student.

**Student ID Cards**

Students may optionally purchase an official IST Student ID Card. The ID includes a photo and may be used to provide proof of status as an IST student. Students may request a Student ID Card by signing into their IST account.

**Library Resources**

The Institute of Science and Technology utilizes the Linda Hall Library, which is a local online and on-ground research library with over 1,000,000 volumes, journal articles, and research papers as its primary library/research resource. The Linda Hall Library is a privately endowed American library of science, engineering and technology located in Kansas City, Missouri. It is the "largest independently funded public library of science, engineering and technology in North America" and "among the largest science libraries in the world." For more information visit www.lindahall.org.

All IST students have access to the Linda Hall Library e-resources. The Linda Hall Library databases contain thousands of peer-reviewed academic journals, newspapers, trade publications, eBooks, encyclopedias, data, audio and, video clips and magazines chosen to support research in the programs at IST.

IST students can request specific documents from the Linda Hall Library that may not readily be available elsewhere. The library will research, locate, and scan and email the document to the student. There is a nominal fee for this service which is the student’s responsibility if they choose to use this service. Reference assistance is also provided by the library through email within 24 hours. Assistance may include attachments, short custom demonstration videos, search strategies, screen captures, articles, and trusted web links.

Additional resources available:
• Encyclopedia of Science and Technology – An IST online reference resource containing a compilation of scientific and technological information.

• Journal of Science – A peer-reviewed technical online journal published in electronic format by the International Academy of Science.

• Scientific Community Registry – An online compilation of background information regarding the worldwide membership of the Scientific Community Registry.

**Academic Policies & Regulations**

It is the student’s responsibility to ensure that IST has current contact information including a mailing address to receive mail delivered by the United States Postal Service, email address, and telephone numbers.

**Student Responsibility toward IST Published Material**

Students are expected to read and comply with printed regulations. Members of the administration and faculty will make every “good faith” effort to advise students, but program requirements and IST policies and procedures will not be waived, nor exceptions granted because a student is unaware of the requirements or policies and procedures.

Students are expected to observe the highest standards of conduct and need to sign a Code of Student Conduct Agreement affirming their alignment with and willingness to comply with all IST conduct standards.

Students must assume the responsibility to engage in intellectual study and to comply with all policies and procedures to attain a degree. IST cannot accept the responsibility for the education of any student who is not in alignment with the purposes and the regulations of the Institute.

**Graduation Requirements**

To satisfy the requirements necessary to receive a degree from IST, students are expected to complete all the requirements for their specific degree program and to meet the following Institute requirements.

- maintain satisfactory academic progress towards a degree.
- maintain a minimum cumulative 2.0 GPA for undergraduates and 3.0 for graduates.

**First-Term Critical Actions**

New students at IST who do not complete each of the defined "first-term critical actions" within 45 days from their first term start date will be administratively withdrawn. These actions include:

- Completion of the online Student Orientation
- Completion of Pre-assessment for each course the student is enrolled in
• Completion of first Unit Exam in at least one course

Program Change

A change in program of study will not affect a student's standing provided the new program is in the same credential level as the old program and transfer credit is not added or removed. Students requesting re-entry into the IST will return with the status calculated at the time of withdrawal unless a program change is requested that results in awarding additional transfer credit or removing transfer credit. The Institute will include coursework taken by the student for enrollment in other majors or programs when calculating cumulative GPA. However, if the credential level of the new program is different from the old program (e.g., Bachelor's degree program into Master's degree program or vice versa), the student will begin as a first term student with a new history.

Scholarship Recipients

IST has a limited number of scholarships to cover the full-tuition expenses to earn a degree. At this time, only students that meet the criteria for a full-tuition scholarship will be admitted to IST. Failure to meet GPA standards in any given term can result in termination of a scholarship, in which case the student would be withdrawn from the program. Awards are limited to tuition-only and will not cover student expenses for books, a student computer, or other education-related expenses.

Minimum and Maximum time to finish the degree

Undergraduate Degrees
Students taking five courses at a time are considered to be full time. Part time study is considered four or less courses. The minimum undergraduate degree completion rate is two semesters. Students may take up to ten years to complete the program. Students who take longer than ten years may be required to go through the enrollment process.

Master's Degrees
Students taking four courses at a time are considered to be full time. Part time study is three or less courses. The minimum completion rate is three semesters. Students may take up to ten years to complete the program. The maximum time frame for the degree completion cannot exceed 10 years and cannot be completed in less than two semesters.

Doctoral Degrees
Students taking four courses at a time are considered to be full time. Part time study is three or less courses. The minimum completion rate is five semesters. Students may take up to ten years to complete the program. The maximum time frame for the degree completion cannot exceed 10 years and cannot be completed in less than two years.

Extensions

Every student is expected to complete all assignments on time as specified in their course syllabus within the 15-week timeframe. (Course due dates may vary, students must double check each syllabus upon starting a new course.) The extension policy exists as an option for students who experience a significant life event that disrupts their ability to complete a course, such as medical or family emergency or deployment. The student is responsible for requesting an
extension from their instructor and ensuring the extension contract gets approved and filed with the Registrar. Students who elect to request an extension forfeit the right to withdraw from the course or request a Leave of Absence. The criteria for the extension policy are listed below.

**Eligibility**

- A student must have demonstrated steady participation in the course and maintained regular communication with their instructor to be eligible for an extension.
- An extension may be contracted with instructor agreement/approval.
- An instructor may agree to an extension if the student has completed at least 50% of the course and can reasonably complete the course within a stated time frame, not to exceed 60 days from the regular course end date.

**Process**

- The extension contract form will indicate an agreed-upon finish date.
- The extension contract form must be initiated and signed by the student at least seven days before the course end date.
- If the instructor approves and signs the extension contract form, the extension contract will be filed with the Registrar by the final day of class.

**Important**

- No extension contracts will be granted after the course end date.
- An extension contract may not be extended beyond the agreed-upon finish date.
- The Registrar reserves the right to void an extension contract if 1) the student has more than two extensions in progress; 2) if the contract arrives after the course end date.
- A student's grade is set as "IE" (Incomplete Extension) by the Registrar until the coursework is finished or until the extension expires, whichever comes first.
- Within five days of the finish date, the instructor submits the student’s final grade (A-F) for the course based on what the student completed for the course; failure to uphold specifics outlined in the extension contract may result in an automatic “F” (fail).
- Students who extend a course are obligated to pay for the course in full regardless of whether the course is completed. The financial obligations of students on extension are unchanged.

**Transferring from IST**

IST students who may be interested in transferring to another institution, either before or after completing their studies at IST should keep in mind the following points:

- All institutions reserve the right to determine their own transfer policies, and not all academic work completed at one institution may transfer to another.
- Students should check the transfer policies at the institution or institutions they are considering by consulting with the admissions or registrar office at those institution(s).
- Students who transfer should request that the IST registrar send an official transcript of their IST transfer credits and academic work to the institution(s) where they are applying for admission.

**Term Registration and Enrollment**
Students can start at any time after they have received notification of acceptance. The length of semester is 15 weeks from that start date. Students may only be enrolled in a single term and are considered enrolled and active once the term enrollment has been established. The term enrollment process is important because by accepting enrollment, the student is agreeing to pay tuition in full, complete the courses by the end of the student's term, and adhere to IST’s academic policies.

Students who do not complete registration and enrollment may not begin. First term students must also complete one of the First Term Critical Actions within 45 days of the start of their first term to avoid administrative withdrawal. Once term enrollment is established, students are considered enrolled for the term and are responsible for tuition charges. Once students have enrolled in a term, they are committed to the courses and changes to enrollment will not be processed.

**Working Ahead or Accelerating Courses**

IST’s self-paced lesson format allows students to study on their own schedule and work ahead only within a given course within a given semester. However, students may not exceed the full-time maximum number of courses within a 15-week semester.

**Course Completion**

Students are responsible for ensuring they complete all courses for which they are enrolled in a term. An incomplete course becomes part of the permanent academic record and transcript for all enrolled courses that are not attempted, not completed or not passed. A student's academic history will not be altered due to, but not limited to, changes in program or course updates. Any changes or updates to the degree plan due to a program change or course change does not negate the student’s responsibility to complete all courses in term enrollment. Courses appearing on the transcript as incomplete will not be altered should a student decide to pursue a program change or course update. Some academic changes may result in a permanent unresolved incomplete course on a student’s academic history and IST transcript.

**Incomplete Course**

IST recognizes there may be circumstances and events beyond a student’s control that interrupt or impede measured progress toward course completion. Students may request an additional seven days to finalize a course for which they registered in original term registration. The first seven days of the subsequent term are inclusive of the subsequent term and do not reset the new term's start date to the 8th. Students may not request an incomplete course (IC) while on term break and may not start a term break while a course is marked as incomplete. Students who have been submitted for administrative withdrawal can be withdrawn during their IC period if academic engagement and/or academic discussion with faculty does not occur.

The Student Services office is responsible for denying or granting the student's request for the **seven-day incomplete** period. The decision to grant the request is predicated upon, but not restricted to:

- The nature of the event(s)/circumstance – must be unforeseen and unavoidable.
- When the event(s)/circumstance occurred – generally in the last 4 to 6 weeks of the term.
• Documented and verifiable academic progress on the course - at least one substantive attempt at an objective assessment, or regular and consistent submissions on a performance assessment are all reviewed (rough drafts may be considered upon appeal).
• Completion of all other courses – only one outstanding course is considered a reasonable request.
• Overall academic progress across terms – consistent academic progress and completion of courses in prior terms.

Incomplete course requests are typically denied for circumstances including, but not limited to:
• Events and circumstances that occur early or in the middle of a student’s term.
• Known or anticipated life events – occupational, vacation, etc.
• Short-term illness and/or minor injuries – cold, flu, cuts, abrasions, etc.
• Inclement weather and/or temporary power outages – snow, rain, wind, etc.
• Lack of engagement in the course prior to the end of the term – attempts, submissions, etc.
• Failure to schedule an exam or find an available testing option before the end of the term.
• Not passing an objective assessment or needing to make revisions on a performance task, without other extenuating circumstances
• Prior and/or multiple requests for an incomplete course(s).
• Students’ ability to receive Financial Assistance, Tuition Reimbursement, Discounts, etc.
• Technical issues related to hardware (computer, internet connection, webcam, etc.) that occur for assessments scheduled or submitted within the last 7 days of the term
• Technical issues related to assessment systems (proctoring, assessment delivery, etc.) may be accepted as grounds for approving an incomplete request provided the issue is documented through the Student Services office.

Requests for an incomplete status must be received by the Student Services office on or before the 25th day of the last month of the student’s term. Requests received after the 25th are generally not considered unless the event(s)/circumstance prevented the request from being made at an earlier date.

If an incomplete status is granted for a course, it may take up to 24 hours after the incomplete status has been approved for the course to properly display in the Learning Management System.

If a student does not complete their course by the end of their incomplete period, the course will be marked Not Passed on their transcript for their original term.

**Attendance Policy**

The Institute of Science and Technology degree programs are structured to maximize student interaction with instructors while allowing the student to maintain autonomy over their academic schedule. Therefore, each student is afforded the freedom to establish his or her schedule, but regular contact with the instructor is a requirement that must be met.

While frequent attendance is expected, assignment submission should be performed by the student at least every two weeks in general. Such diligence helps guide and maintain steady progress towards the completion of assignments and courses, and better assures that assistance is readily available to students in resolving any problematical aspects of their program. Instructors
are authorized to factor the frequency and adequacy of communications into the assignment of a grade for any given course, if applicable.

Because class attendance an integral part of the learning experience, students are required to attend the first class of each course in which they register and adhere to the attendance policy established by the course and stated in the course syllabus. It is the student’s responsibility to withdraw from classes they are unable to attend.

Progress is not always governed by attending a class, but always by successfully completing assessments that demonstrate mastery of the required competencies. Students engage in a variety of learning resources to build competency and prepare for the assessments. In most cases, these learning materials are independent learning resources such as textbooks, video lectures, lesson manuals, simulations, virtual labs, and tutorials, none of which require attendance.

Academic Activity

In addition to the requirements of the Academic Progress policy, students are expected to demonstrate consistent engagement with their studies throughout each academic term. Activities demonstrating academic engagement include, but are not limited to:

- Viewing video lessons
- Completing assigned quizzes and assessments
- Completing pre-assessments
- Completing the student orientation
- Participation in live faculty-led events

Students who are not academically engaged for a period of 14 days will be contacted to reengage with course learning resources. Students who demonstrate 28 days of inactivity will be subject to administrative withdrawal. An academically inactive student will be notified prior to withdrawal.

Academic Progress

The Institute of Science and Technology administration and staff helps students achieve their goals for a degree and career success by providing a personal, flexible, and affordable education based upon real-world competencies. IST takes an active interest in students' progress through their academic programs and requires students to make measurable advancement toward completion of their degree program each term. With this in mind, the Institute has established the following policies:

- Lack of Progress: Within a term, undergraduate or graduate students who complete less than 3 credits will be administratively withdrawn from IST at the end of the term.

- Additionally, students who are readmitted and fail to complete the minimum requirements described above will be administratively withdrawn at the end of the term and will not be eligible for readmission.

Satisfactory Academic Progress Policy
To maintain satisfactory academic progress, students must achieve an overall minimum pass rate of 70 percent for all courses.

Students must maintain satisfactory academic progress towards a degree to remain in good standing. Students who meet the satisfactory academic progress requirements are considered to be in "good standing" status. IST has established and will apply the following standard of academic progress to all degree-seeking (program) students. All undergraduate students are required to maintain a minimum cumulative 2.0 GPA and graduate students are required to maintain a minimum cumulative 3.0 GPA.

Non-Academic Progress Notification

- Students will be notified via the Learning Management System when their cumulative GPA falls below a 2.0.
- As appropriate for the circumstance, the faculty will work with the student to create an improvement plan for the student to get back on track.
- Students will be placed on academic probation only after having attempted 12 credits.

Academic Probation

Undergraduate students whose GPA falls below a 2.0 and Graduate students whose GPA falls below 3.0 will be placed on academic probation. The academic probation process may include the following series of actions as determined by the faculty/staff:

- Reduced course load
- Assigned to academic mentor/advisor
- Follow-up counseling appointments
- Third probationary semester: Students who do not return to good academic standing after two consecutive semesters on academic probation; but who have increased their cumulative GPA, will be allowed to continue their education but will remain on academic probation.

Academic Disqualification

Students on academic probation who have not achieved academic improvement (identified as an increase in cumulative GPA) after three consecutive semesters on academic probation will be dismissed from IST for one semester, commencing immediately. Students may appeal their dismissal in writing to the Student Services office.

Mitigating Circumstances

Mitigating circumstances are those which directly hinder pursuit of a course and which are judged to be beyond student’s control. The following are some general categories of mitigating circumstances. (This list is not all-inclusive.)

1. Serious illness of the student
2. Serious illness or death of the student’s immediate family
3. Emergency financial obligations or change of place of employment or work schedule which precludes pursuit of the course
4. Active-duty military service, including active duty for training

Leave of Absences

Requests for a leave of absence may be made in writing to the Student Services office. Permission for such leave shall be provided at the discretion of the IST President. In individual cases of mitigating circumstances, exceptions may be granted. Requests for exceptions must be made in writing to the Student Services office and accompanied by full documentation.

Concurrent Enrollment

Students who are concurrently enrolled in any other post-secondary institution must notify the appropriate office which school is the parent institution and provide verification of fees paid and credits earned at the other institution.

Semester System

Units earned are awarded based on semester units. A semester consists of 15 weeks and students may enroll and be accepted at any time during the school year. Courses are awarded at 3 credit units per class with a maximum of 12 credits per semester.

Credit/Unit Load

All classes taken for credit constitute the total credit load for each student. The maximum number of units a student may carry without the approval of an academic advisor is 15 credit units during each semester for undergraduate students and 12 credit units during each semester for graduate students.

Withdrawing from Class Refunds

If a student drops during the 100% refund period, no grade will appear on the student’s record. Also, during the 100% refund period an instructor may drop a student for non-attendance and/or not meeting prerequisites. In this case, no grade will appear on the student’s record. After the 100% and 50% (if applicable) refund periods, a student may choose to withdraw up to the midpoint (60%) of a course. During that period, a "W" is assigned to the course and no refund is permitted. After the midpoint of the class has passed, students may not drop a class. There may be conditions under which a student will be administratively withdrawn from a course.

Cancellation of Classes

The Institute of Science and Technology reserves the right to cancel any class. When applicable, students will automatically receive a full refund for a canceled class.

Academic Progress Appeals

A student may appeal an administrative withdrawal for lack of academic progress by emailing studentservices@science.edu from their IST email address. Students must submit their appeal from their IST email address between the 25th of the final month of the term and the 5th of the following month. A student who is administratively withdrawn for lack of academic progress may
appeal for readmission for a start date agreed upon by the Student Services office. Readmission is not guaranteed. Appeals should be titled “Academic Progress Appeal.” The appeal must include the following information along with any other details the student feels should be considered:

- Clearly state the reasons that the academic progress requirement was not met.
- Detail a plan for success in the new term if allowed to remain enrolled.

**Grading Policy**

**Assignment of Grades**

As Course Instructors review student assignment submissions, they look for three broad quality areas to be appropriately evident:

- **Demonstrated Comprehension:** Evaluation is primarily focused on the demonstrated quality of thought and the comprehension of the subject matter.

- **Synthesis and Analysis:** Instructors evaluate critical thinking and synthesis of the core material, through an appearance that demonstrates thought provoking analysis of the core concepts, including original ideas presented as an extension of course material.

- **Research and Quality of Resources:** Research and quality of resources are an integral element of a student's work and will constitute a large portion of assignment work. Textbooks are introduced as a single resource amongst many, with the expectation that students will conduct a substantial amount of additional research to present a cohesive, multi-faceted view of subject material.

Where applicable, students are provided with an assignment rubric that is used by course instructors to score their assignments. These rubrics are available for each course and are specific to the assignment type. A signature assignment is a student artifact that represents scaffolded learning across a course. It is usually that final assignment of the course, generally a research paper or a capstone project. As such, the assignment is summative in nature only and directly measures course learning objectives, program learning goals, and Institute mission-based outcomes for both assignment grading and assessment of student learning purposes. In some cases, students who do not pass the signature assignment also do not pass the course.

The balance of assignments in a course are graded with rubrics designed for specific deliverable types and are not used for Institute assessment data collection and analysis. Examples include rubrics for a PowerPoint, for an essay, for a journal entry, for discussion questions, for an article analysis, etc.

Both signature assignment and assignment type rubrics are scored and provide a numeric value for an assignment that is averaged in with all course assignment grades to calculate the final grade of the course. Where applicable, students are encouraged to review all assignment rubrics prior to assignment submission as a means to assist them in assignment construction.

Grades are transcribed upon completion of a course of study. A course(s) of study in progress will not appear on the transcript until the end of a term.

**Grades and Satisfactory Progress**
Grades are awarded on a traditional A+, A, A-, B+, B, B-, C+,C-, D+, D-, F, system. The minimum passing grade in a bachelor’s level course is a C-. The minimum passing grade in master’s or doctoral level courses is a B-.

The minimum allowable cumulative grade point average to maintain satisfactory progress for the bachelor’s degree program is a C, or 2.0. The minimum allowable cumulative grade point average to maintain satisfactory progress for the master’s degree programs and doctoral degree program is a B, or 3.0. In calculating a student’s grade point average, the following policy applies.

**Grading Scale**

<table>
<thead>
<tr>
<th>Score</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% - 98%</td>
<td>A+</td>
<td>4.00</td>
</tr>
<tr>
<td>97% - 94%</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>93% - 90%</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>89% - 88%</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>87% - 84%</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>83% - 80%</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>79% - 78%</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>77% - 74%</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>73% - 70%</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>69% - 68%</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>67% - 64%</td>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>63% - 60%</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>59.9% or Under</td>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Only course grades of A+ though F will be used to calculate the Cumulative Grade Point Average. In addition, if the student has not completed the coursework and earned a grade, either an Incomplete (I), Incomplete Extension (IE), or Withdraw (W) will be issued: an Incomplete (I) to indicate a leave of absence has been approved, and Incomplete Extension (IE) indicating that an extension has been granted or an Leave of Absence has been approved, a Withdraw (W) to indicate withdrawal, or an F/X to indicate that no work has been submitted in the course will be issued.

Also, to allow for students to successfully comply with Academic Discipline policies we will apply the following:

For successful repeats of failed courses, the failed grade(s) will be removed from the student’s units attempted for CGPA calculation purposes. The failed grade(s) will remain in the student’s internal academic record, as will the relevant form(s). Repeat courses will be marked with an “R” for repeat on the student’s transcript.

**Proctoring Policy**

To ensure authenticity of student work, IST requires proctored exams at key points within each course. These exams are proctored online by a live person assigned by IST (usually a faculty member). The number of proctored exams and their placement in the curriculum is determined at the program level. Upon enrolling in a course, students will be provided with a schedule
designating specific dates and times during which a proctor will be available. The student must have a web cam and microphone enabled at all times during a proctored exam session.

Degree Plan/Courses of Study

Upon admission to IST, the Student Services office will advise students on the creation of a customized degree plan detailing the specific courses they will need to take, and the progression in which they are offered. The degree plan lists the courses of study required to complete an academic program. Each course of study is assigned three semester units and as part of the plan is offered in sequence to fulfill degree requirements.

Credit Hour Policy

The Institute of Science and Technology offers degree programs and credit courses using a semester credit hour system. At IST, one credit hour is defined as the equivalent workload of 15 hours of direct instruction and a minimum 30 hours of out-of-class student work for the course. This is congruent with the metric interval used by the Carnegie system, where 45 clock hours equate to one (1) credit hour.

IST’s definition of a credit hour is consistent with the federal regulation (CFRs 600.2 and 600.4), which defines the credit hour as “the amount of work represented, intended learning outcomes, and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

- One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester of credit or
- At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

A three-credit course would require 135 hours or more of work effort. For IST, clock hours or seat time is calculated not by measuring the amount of time a student sits in a traditional classroom and listens to a professor, but instead it is calculated by measuring all the behaviors of the student, such as

- the time it takes to read pages of a textbook or online resource each week,
- the time it takes to write a discussion post and reply to several peers,
- the time it takes to create or read presentations and multimedia resources like videos or narrated slideshows, and
- the time it takes to type and edit written assignments related to each learning module of course content.

For every course the credit count equivalency to clock hours has been calculated to be certain that the Carnegie system is being followed.
Voluntary Course Retake Policy

Voluntary Student Retake Policy Students may repeat any course, paying all standard and appropriate tuition and fees for the course or courses to improve their Cumulative GPA.

Compliance with the Americans with Disabilities Act (ADA)

The Institute of Science and Technology is committed to providing equal access to its academic programs to all qualified students. Student Accessibility Services supports this mission by providing support, resources, advocacy, collaboration, and academic accommodations that conform to federal and state statutes and regulations to IST students and prospective students.

IST complies with the Americans with Disabilities Act of 1990 (the "ADA"), the Rehabilitation Act of 1973, and other applicable disability discrimination laws. IST is committed to providing reasonable accommodation(s) to qualified disabled applicants and learners in IST programs and activities as required by applicable law.

The determination of reasonable accommodation(s) for qualified students with disabilities, and compliance with the ADA and the Rehabilitation Act, are the responsibility of IST Student Accessibility Services. Student Accessibility Services is the principal point of contact for all students with disability questions or concerns (compliance@science.edu).

IST encourages current and prospective students needing accommodation(s) and/or resources to contact Student Accessibility Services for assistance.

The Institute of Science and Technology does not discriminate based on disability in admission to, access to, or operation of its instructions, programs, services, or activities or in its hiring and employment practices. We are dedicated to providing reasonable accommodations to facilitate the participation of covered individuals with disabilities and accept our obligations to follow the Rehabilitation Act of 1973, Americans with Disabilities Act of 1990, and ADA Amendments Act of 2008.

IST will reasonably accommodate individuals with documented and self-disclosed disabilities. Students wishing to receive reasonable accommodation have the responsibility to self-disclose their disabilities and to release medical documentation supporting the self-disclosure. The confidentiality of information related to individuals requesting accommodations shall be maintained on a need-to-know basis and strictly respected insofar as it does not interfere with IST’s legal obligations.

Self-disclosure documentation must include the following:
- Medical professional’s name and contact information, along with a description of their credentials, area of expertise, and information about any special qualifications for assisting people (and/or students) with the noted disability.
- Statement of diagnosis.
- Summary of diagnostic criteria, facts, and observations on which the medical professional based the diagnosis.
- Summary of the disability-related impairments only as they relate to the ability to learn and participate in IST’s online curriculum.
• List of accommodations recommended by the medical professional to allow for participation in full accordance with IST’s educational program and to enable effective learning in an online environment.

Reasonable prior notice is needed to evaluate requests for accommodations and to implement them when appropriate. Submissions will be reviewed, and an approval or denial will be sent to the student within 30 days of receipt. Student requests for accommodation must be submitted in writing prior to beginning coursework and must include the appropriate documents. These forms will be evaluated by IST Administration. All requests for student disability accommodation, as with any academic program application/enrollment and/or matriculation process, will be evaluated in accordance with the criteria defined and established by the ADA.

IST cannot provide course substitution or allow students to forfeit a required course that is a prerequisite for graduation. Per the ADA and Section 504, institutions are required to provide reasonable accommodations. Institutions are not expected to endure financial or administrative costs or undertake extra organizational work that would modify or revise the academic program. Denial of access and/or discrimination or harassment based on an individual’s disability status or denial of academic accommodation, may be grieved through IST’s grievance process. compliance@science.edu

Students may submit all written documentation from their health care providers to IST Administration at the main campus address listed on the front of this catalog.

IST complies with applicable laws concerning the confidentiality of disability-related health information and it is committed to ensuring that all information regarding student health remains appropriately confidential. If a student wishes to have a record deleted during their enrollment, they must send a written request to compliance@science.edu.

Students may authorize the release of disability information to people or organizations outside of IST. Before providing such authorization, students should understand the nature of the information to be released and the purpose. IST may infrequently be required by law to disclose disability information without student consent.

Student Code of Ethics

The Institute of Science and Technology is a community of scholars in which the ideals of freedom of inquiry, freedom of thought, freedom of expression, and freedom of the individual are sustained. However, the exercise and preservation of these freedoms and rights require a respect for the rights of all in the community to enjoy them to the same extent.

Academic Authenticity

Students are responsible for following the policy regarding the authenticity of their work:

• IST holds, as a core value, that respect for ideas and intellectual property rights is a critical value in academic communities. All members of the Institute community share responsibility in ensuring that the authentic expression of those ideas is observed.
• Academic Authenticity means the ethical completion of coursework. Examples include appropriately attributing text, pictures, tables and graphs used in coursework to the creators, and each student completing their own coursework. Academic Authenticity is fundamental to the educational process at IST.

The following policies apply to all students and assessments regardless of location, and every student is expected to uphold these Academic Authenticity rules:

**Intellectual Property**

• Students may not use any information found, requested, or purchased on the Internet (or elsewhere) that may include assessment materials or responses to those materials (i.e., answers to assessment questions or projects completed by someone else).

• Similarly, students may not create and/or transmit responses to assessments or projects, as those responses may potentially be submitted to IST or another institution by someone else.

• Students may not copy, record, or disclose IST assessment or project material to anyone else. This includes copying for personal use and disclosure on websites, blogs, and other social media.

• Any previously completed Capstone Project from another IST degree or another institution is not permitted to be used for the creation and submission of the Capstone Project for the degree in which the student is currently enrolled.

• Students may consent to have their capstone work archived for restricted view by other students and alumni. They may also use and repurpose their capstone and other performance tasks for use when they graduate as an electronic portfolio in furtherance of the academic or professional careers with care not to violate rules above.

**Assessments**

A. General

• Unless directed by official IST course instructions to work with other students, all assessments and projects must be the student’s own individual work. Students are not allowed to engage in unauthorized collaborative efforts with, or obtain assistance from, others at any point in the research, creation, completion, submission, or revision of assessments.

• Students shall not falsify or deliberately misrepresent information submitted to meet the requirement of any assessment.

B. Objective Assessment

• When taking a proctored assessment, the student may not access any device or material not specifically approved in advance, nor communicate with anyone except the proctor, this includes reading the questions aloud.
• All audio and video equipment must be in working order, and the student is required to
remain in the view of the proctor at all times.

C. Performance Assessment
• If students use material from any source, an appropriately formatted citation must be
provided. To use the work of another without proper citation is plagiarism and may lead
to sanctions, including suspension or expulsion from the university.

• All assessments and projects submitted by any IST student will be evaluated for
compliance with these rules. All written work will be checked utilizing originality software,
for evidence of plagiarism. To protect each student’s identity, students are encouraged
to remove all personal information, such as phone numbers and addresses, from each
assessment or project. The plagiarism checker will store a copy of all work submitted to
prevent its use by other students.

Academic Dismissal Policy

Academic Dishonesty:

Academic dishonesty is a broad category that includes plagiarism, cheating, and any other
deliberate attempts to present false information, falsify records, data, or other information relevant
to activity associated with a course or academic function. This list is not exhaustive but intended
to summarize the most common types of dishonesty exhibited in academic settings.

The Student Code of Ethics shall apply to conduct that adversely affects the IST Community
and/or the pursuit of its objectives. Each student shall be responsible for his/her conduct from the
time of application for admission through the actual awarding of a degree, even though conduct
may occur before courses begin or after courses end, during periods between terms of actual
enrollment, and conduct that is not discovered until after a degree is awarded. The Student Code
shall apply to a student’s conduct even if the student withdraws from school while a disciplinary
matter is pending.

Responses to academic dishonesty will vary depending upon the level of dishonesty
demonstrated. Dishonesty at its lowest level may include that associated with a class assignment
and increases in the level of seriousness depending upon the significance of the activity. The
highest levels of dishonesty will be defined by multiple events and major exams or projects.

Level 1. Dishonesty may be handled at the discretion of the course faculty member after
consultation with the President. The minimum penalty for such dishonesty should be failure on
the particular assignment.

Level 2. Dishonesty at this level will be addressed jointly by the faculty member and the President.
A formal record with the name of the student(s) involved, the nature of the dishonesty, and the
decision of the faculty member and President in the matter. The minimum penalty for such
dishonesty will be failure on the particular exam or project. The maximum penalty would be failure
of the course.
Level 3. Dishonesty at this level must be reported to the President for joint action of the faculty member and President. Sanctions may include failure of the course in question, suspension, or dismissal from the program.

Level 4. Dishonesty on multiple occasions or activities is the highest level and will likely result in suspension or dismissal from the academic program. This decision will be made by the President in consultation with the faculty members and IST administrators.

A student who is suspended will have a specific period of time to address the identified issues after which matriculation may continue at the sole discretion of the President.

A dismissed student will not be eligible to reapply. Normal appeal opportunities are available to students disciplined for academic dishonesty.

Non-Academic Dismissal Policy

In a community of learning, willful disruption of the educational process, destruction of property, and interference with the orderly process of IST as defined by administration or with the rights of other members of IST cannot be tolerated.

Students enrolling in IST assume an obligation to conduct themselves in a manner compatible with IST’s function as an educational institution. To fulfill its functions of imparting and gaining knowledge, IST retains the power to maintain order within IST and to exclude those who are disruptive to the educational process.

In support of the Code of Student Ethics, any violations of the Code of Student Ethics or policies and procedures may result in disciplinary action and/or criminal prosecution. Violations of academic and/or supplementary standards will be handled through IST administration.

Violations of conduct standards, supplementary standards, policies, and/or procedures will be handled by the Office of the President. Students are required to be familiar with the rules, policies, and Student Code of Ethics.

All IST students are expected to abide by the following rules:

- Students may not use, possess, or dispense illegal drugs on campus.
- Students may not bring alcohol on campus.
- Theft and dishonest behavior are prohibited.
- Students must not be found in violation of the law.
- Smoking is not allowed on campus.
- Weapons are prohibited on campus.
- Students are not permitted to possess any potentially dangerous materials.
- Restricted areas should not be entered without permission.
- Students are expected to abide by all rules and policies of IST
- Students may not use IST resources to obtain or disclose the personal details of another member of the IST community
- Use of IST systems to send obscene or harassing messages is prohibited
- Students must only use their own user’s name and/or password for their own work
- It is unauthorized to use or change IST resources for any purpose
Unprofessional conduct including harassment, threatening, bullying or verbal abuse of any member of the IST community by any means (conduct, speech, written notes, electronic mail, etc.) is not acceptable. This includes, but is not limited to, the use of threats, profanity, and demeaning or intimidating comments.

The Institute expects all students to adhere to the highest standards of academic integrity. IST defines academic integrity as academic honesty. “The Institute of Science and Technology is an academic community and expects its students to manifest a commitment to academic integrity through rigid observance of standards for academic honesty.”

Students found in violation of one or more of the above conditions may lose their scholarship and, in extreme cases, force IST to cancel their enrollment in the Program.

Student Complaint / Grievance Policy:

IST is committed to maintaining policies and procedures supportive of the student community. Students must follow specific policies and instructions described in this catalog and in course schedules, program brochures, websites, and information sheets.

Formal grievances fall into three categories: harassment or discrimination grievances, academic grievance, and administrative grievances. Details on how to submit a formal grievance are described below. Before a formal grievance is filed by completing Student Action Request (SAR) students should seek help and assistance in resolving their issue or concern.

If after consultation with an advisor the student wishes to proceed with a formal grievance, the completed SAR needs to be submitted to the Student Services office in writing to studentservices@science.edu.

The following information must be included in the Student Action Request. Requests lacking the required information will not be reviewed:

1. Student Name
2. Student ID Number or Social Security Number
3. Major/Program
4. Day/Evening Phone Number
5. Mailing Address
6. Email Address
7. Problem: Provide an explanation of the problem and include any pertinent documentation as support.
8. Action Requested: Provide explanation of the requested action. Include the referring page in the current Student Catalog for the policy in question or any other relevant information, including specific courses or term.
9. Prior Action Taken: Provide a list of all individuals contacted about the problem, including their departments.

Grievance procedures must be initiated in a timely fashion no later than the end of the term following the occurrence of the grievance issue. The student may forfeit all rights under the grievance procedure if each step is not followed within the prescribed time limit.
The student complaint policy provides guidance on proper avenues for addressing Institute-related concerns. A complaint is an expression of dissatisfaction arising from a student’s experience with or treatment by Institute personnel or policies. A grievance is a complaint based on a perceived unfairness or discrimination. Academic and financial appeals (i.e., issues related to competency assessments, academic progress, academic outcomes, financial assistance, payments, etc.) are NOT considered complaints and should be handled through the processes published by the relevant departments.

IST is committed to providing students with a safe learning environment in which students receive an excellent level of service in support of their educational pursuits. Accordingly, all students have the right to file a complaint or grievance which they deem important without fear of retaliation or other adverse consequence.

Informal Complaints

IST encourages students to seek resolution directly with the faculty or appropriate Institute representative. Many issues can be settled through open and honest communication between the involved parties. This practice allows issues to be resolved more quickly by individuals with appropriate proximity and expertise. Students who need assistance with informal complaints are encouraged to contact the Dean.

Formal Complaints

If a non-academic problem cannot be resolved through the informal complaint process, students may initiate a formal complaint by submitting a detailed summary of the concern to complaints@science.edu in writing. This written complaint must include: a description of the complaint, information about who has been involved (including contact information, if possible), steps taken to resolve the complaint informally, current status of the complaint.

IST will work to expeditiously resolve each complaint. Students will receive confirmation of receipt of a formal complaint within one (1) business day, including requests for additional information, if required. Students will normally receive a response to their complaint within seven (7) business days. However, if additional time is needed to research and respond to a complaint, the student will be notified of the reason and given an anticipated resolution timeline. After the Institute has completed any necessary investigation, a final determination regarding the student’s complaint will be provided to the student in writing. Upon responding to or addressing a formal complaint, the Institute will consider it closed.

Students who believe they have grounds to dispute the determination may exercise their right to an appeal. Grounds for appeal include: evidence that the determination was based on an unfair bias or that a conflict of interest was present, evidence that the determination violates one or more IST policies, new and/or previously unconsidered evidence is available and would have influenced the outcome, or evidence that the determination was arbitrary or did not consider evidence provided by the complainant.

The appeal must be filed within five (5) working days of the receipt of the determination unless good cause can be shown for an extension of time. The appeal must be filed in writing as an email reply to the individual who provided the determination and must include a brief justification and the appellant’s desired outcome.
Within ten (10) working days of the receipt of the appeal, the IST President will conduct a review of the appeal to determine if grounds are present and further action is warranted. The IST President may take whatever action is determined necessary to ensure a thorough review of the appeal. The IST President may uphold the original determination or make a new determination. The appellant will be notified of the outcome of the appeal in writing. This determination will be considered final with regards to the appeal in question.

We strive to resolve all student conflicts and complaints in the best interest of the student. If the student feels their issue has not been properly addressed, the student may submit a written complaint to the Missouri Department of Higher Education and Workforce Development (MO-DHEW). MO-DHEW states that the student must first exhaust all opportunities to resolve the conflict at the institution level. If the student feels they have exhausted all the options, they may submit a complaint in writing to:

Missouri Department of Higher Education and Workforce Development
PO Box 1469
Jefferson City, MO 65109
Attn: Complaint Processing

Civil Rights Complaints (Including Sexual Harassment or Misconduct [Title IX])

If a complaint involves any type of alleged discrimination or harassment in violation of the IST Equal Opportunity, Harassment, and Nondiscrimination Policy and Grievance Processes or the student wishes to remain anonymous, the student or any other offended party may immediately make a formal complaint to the IST President.

Sexual Harassment

IST is committed to providing an environment without discrimination, intimidation, and harassment. In keeping with this commitment, we believe that it is necessary to affirmatively address this subject and express strong disapproval of sexual harassment.

Any type of sexual harassment is against IST policy and may be unlawful.

We firmly prohibit sexual harassment of any student, faculty or staff member by another student, faculty, or staff member. Harassment of third parties by anyone associated with IST is also prohibited. While it is not easy to define precisely what sexual harassment is, it may include: unwelcome sexual advances, requests for sexual favors, and/or verbal or physical conduct of a sexual nature including, but not limited to, sexually-related drawings, pictures, jokes, teasing, uninvited touching or other sexually-related comments. The conduct prohibited by this policy includes conduct in any form including but not limited to e-mail, voice mail, chat rooms, Internet use or history, text messages, pictures, images, writings, words or gestures.

Sexual harassment of a student, faculty, staff member, or third party will not be tolerated. Violations of this policy may result in disciplinary action, up to and including discharge. There will be no adverse action taken against individuals who report violations of this policy in good faith or participate in the investigation of such violations.
All individuals associated with IST are responsible for conducting themselves in a manner consistent with the spirit and intent of this policy.

Confidentiality and Privacy Policy:

Family Education Rights and Privacy Act (FERPA). In accordance with institutional policy and the U.S. Family Education Rights and Privacy Act of 1974 (FERPA), IST vigorously protects the privacy of student education records. The institution does not release private records of individual students, such as grades and class schedules, without prior written consent of the student or as specifically authorized by FERPA. Some of the exceptions to the prior written consent exceptions are reviewed below.

As permitted under federal law, the sole exception to the above practice is the release of “directory” information considered to be public in nature and not generally deemed to be an invasion of privacy. At IST, the following categories are defined as “directory” information: student name, local and home address, place of birth, telephone number, most recent educational agency or institution attended, email address(s), semesters of enrollment, full-time/part-time status, degree(s) awarded, emphasis field(s), certificate field(s), honors and awards, and date(s) of graduation.

- Administrative offices will use photographs as an additional safeguard in verifying a student’s identity.
- Faculty and staff members will have access to student photos for class rosters, testing, and academic advising.
- Student photos CANNOT be released to third parties without consent of the student. Photos are for internal use only by College Officials.

Students have the right to request non-disclosure of directory information. If they do not restrict release of this information, it is probable that the information will be released and disclosed. Directory information may also be provided by commercial purposes to businesses affiliated with the institution, honor societies, the alumni association and foundation, or other individuals for purposes that may be beneficial to students. The institution exercises discretion in responding to requests for directory information and may or may not provide such information when requested, depending on the intended purpose of the request. The institution does not sell or rent student information for a fee.

If a student restricts release for non-commercial educational purposes, the institution will be unable to place the student’s name in publications such as honors and graduation programs; to confirm graduation and dates of attendance to potential employers; to verify enrollment with organizations such as insurance companies; or to send notifications about specialized scholarships without the express written authorization of the student.

The student has the right to:

- inspect and review the student’s education records within 45 days of the day that IST receives a request for access. Students should submit to the Office of the Registrar written request that identify the record(s) they wish to inspect. The Registrar’s office will arrange
and notify the student of the time and place where the records may be inspected.

- request the amendment of the student’s education records that the student believes is inaccurate or misleading. Students who believe that their education records contain information that is inaccurate or misleading or is otherwise in violation of their privacy or other rights, may discuss their problems informally with the IST Registrar. If the decision agrees with the student’s request, the appropriate records will be amended. If not, the student will be notified within a reasonable period that the records will not be amended and will be informed by the IST Registrar of their right to a formal hearing.

- consent to disclosures of personally identifiable information contained in the student’s education records, except to the extent that FERPA authorizes disclosure without consent. One exception that permits disclosure without consent is disclosure to school officials with legitimate educational interest. A school official is a person employed by IST in an administrative, supervisory, academic, research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom IST has contracted (such as an attorney, auditor, collection agent, loan servicing agent, or the National Student Clearinghouse); a person serving on the Board of Trustees; or a student serving on an official committee (such as a disciplinary or grievance committee) or assisting a school official in performing his or her task.

- file a complaint with the Family Policy Compliance Office, US Department of Education, 400 Maryland Avenue, SW, Washington D.C. 20202-4605 concerning alleged failures by the Institute of Science and Technology to comply with the requirements of FERPA.

Deceased Student Records:

Records of deceased students will be made available to the parent(s), spouse, or executor/executrix of the deceased student and other authorized parties upon written request. The request must include the need for the record; must identify the requestor’s relationship to the deceased student; and must be accompanied with an official record certifying authorization to receive the student records (i.e., assignment as executor/executrix). An official copy of the death certificate must accompany the request if IST does not have prior official notice of the student’s death. IST reserves the right to deny the request.

For further assistance, students should contact the Registrar’s office.

It should be noted that the above FERPA rights are afforded to both current students as well as alumni. Student’s may contact resources below for more information regarding FERPA educational rights and privacy.

Call: 1-800-USA-LEARN (1-800-872-5327) / TDD Call: 1-800-437-0833

Course Descriptions

IST offers programs at the undergraduate and graduate levels in the areas of Applied Chemistry, Applied Physics, Electrical Engineering and Computer Science, Cyber Security, and E-Learning. The following are course descriptions for these programs.

General Education Courses

CHEM123. Introduction to Chemistry (3 credits)
This course introduces students to the substances that make up our world and the changes these substances undergo. Some of the topics covered include the following: matter and change; atomic and molecular structure; the Periodic Table; states of matter; solutions; chemical reactions; and stoichiometry.

CHEM130. Basic Chemistry (3 credits)
In Basic Chemistry, students study matter – element, compounds, molecules, and ions: their composition, structure, properties, behavior, and the changes they undergo during reactions with other substances. Among the many topics covered in this course include atomic structure; intermolecular forces and bonding; chemical reactions; kinetics; thermodynamics; and equilibrium.

EECS104. Computer Science Principles (3 credits)
Computer Science Principles is an introductory computing course that introduces students to the field of computer science. Students learn to design and evaluate solutions and to apply computer science to solve problems. They use data to discover new knowledge. Students learn how computing innovations and computing systems work and explore their potential impacts.

EECS105. Intro to Computer Science (3 credits)
In this course, students learn and practice skills of designing, developing, and analyzing their own computer programs. Among the many topics covered include program design and development; code logic; implementation of program code; and code testing. Ethical and social implications of computer usage is also discussed.

ENGL101. English Composition (3 credits)
In English Composition, students develop their writing and rhetorical argument abilities by reading, analyzing, and writing evidence-based analytic and argumentative texts. Among the many topics covered in this course include rhetorical analysis of nonfiction texts; claims and evidence; reasoning and organization; and style. Students learn to evaluate, synthesize, and cite research supporting their arguments.
ENGL102. English Literature (3 credits)
English Literature teaches students how to analyze the literature they read. Students engage in close reading and critical analysis of imaginative texts, deepening their understanding of ways authors use language to convey their message. They learn about concepts including setting, character, perspective, structure, and figurative language. In addition, students practice their writing skills as they write expository, analytical, and argumentative essays on their own personal analysis and interpretation of literary works.

HUFA105. Drawing (3 credits)
In this introductory college-level drawing course, students’ work is informed and guided by observation, research, experimentation, critical analysis, and reflections relating individual practices to the world of art. Students document their artistic ideas and practices to demonstrate conceptual and technical development over time. Students work with diverse media, styles, subjects and content and become inventive artistic scholars, able to contribute to visual culture through art making.

HUFA114. Music Theory (3 credits)
In this introductory college-level music theory and aural skills course, students cultivate their understanding of music theory through analyzing performed and notated music. Students learn to recognize, understand, describe, and produce the basic elements and processes of performed and notated music. Course content extends from the fundamentals of pitch, rhythm, timbre, and expression to concepts of harmonic function, phrase relationships, and tonicizations. Students study these concepts in heard and notated music, with emphasis on identification and analysis of musical features, relationships, and procedures in full musical contexts. Students develop musicianship skills through melodic and harmonic dictation, sight singing, and error detection exercises. Writing exercises further emphasize the foundational harmonic and voice-leading procedures of Western art music.

HUFA137. Collaborative Theatre (3 credits)
Collaborative Theatre focuses on the network of art forms that work together to tell a story on the stage. Students examine the inception of theatre and its history as well as the tools and techniques of theatre artists, both onstage and backstage. They also explore scenic and costume design.

MATH101. Technical Math (3 credits)
In this course, students will learn essential math skills necessary for future success in life. Students review basic math functions, the metric system, formulas, introductory algebra, applied geometry, and basic statistics with real-world, practical applications integrated throughout.

MATH103. Business Math (3 credits)
In this course, students will be provided with a foundation in mathematical operations as they apply to business. Students will learn the concept of profit. Topics covered include percentages, discounts, markups, interest, installment buying, depreciation, investments, inventory, taxes,
insurance. Students learn basic accounting practices and principles and the importance of statistics.

**MATH105. College Algebra (3 credits)**
In College Algebra, students develop competence working with functions and applying their properties to solve relevant, real-life examples. Students explore several families of functions including linear, polynomial, piece-wise defined, quadratic, exponential, logarithmic, rational, and radical functions. Students review systems of equalities and inequalities. They gain proficiency performing operations on the various functions, including graphing, factoring, and solving.

**MATH106. Analytical Geometry & Trigonometry (3 credits)**
In this course, students learn the skills needed to apply geometry and trigonometry to solve real-world problems. Among the many concepts covered include practical geometry; plane trigonometry; polygons and solids; angles; vectors; polar coordinates; complex numbers; applying, graphing and transforming trigonometric functions and their inverses; solving trigonometric equations; and use of various trigonometric laws, formulas, and identities.

**MATH108. Statistics (3 credits)**
In this introductory college-level statistics course, students are introduced to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students cultivate their understanding of statistics using technology, investigations, problem solving, and writing as they explore concepts like variation and distribution; patterns and uncertainty; and data-based predictions, decisions, and conclusions.

**MATH110. Introduction to Calculus (3 credits)**
In Introduction to Calculus, students acquire the knowledge and skills needed in preparation for calculus and other related courses required in many undergraduate majors. Specific topics include linear, quadratic, power, polynomial, exponential, logarithmic, rational, and trigonometric functions, their properties, equations, and solutions; transformation of functions; mathematical modeling; sequences; analytic trigonometry; systems of equations and equalities; vectors and matrices; conic sections; polar coordinates and graphs of polar equations; complex numbers in polar form; and to use appropriate technology to model and solve real-life problems. Students are also introduced to limits, differentiation, and integration.

**MATH111. Calculus I (3 credits)**
In Calculus I, students are introduced to calculus. Students cultivate their understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions.
MATH112. Calculus II (3 credits)
Prerequisite: MATH111
Calculus II extends the calculus principles learned in Calculus I. Students cultivate their understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions. In this course, students apply the content and skills learned in the previous course to parametrically defined curves, polar curves, and vector-valued function, develop additional integration techniques and applications, and are introduced to sequences and series.

PHYS151. Introduction to Physics (3 credits)
In this algebra-based physics course students explore why things in nature behave as they do. Some of the main areas of study include motion, energy, electricity, magnetism, light, sound, and optics.

PHYS171. Fundamentals of Physics (3 credits)
Fundamentals of Physics is an algebra-based physics course focused on helping students understand how the universe behaves. Among the many topics covered in this course include kinematics; dynamics; circular motion and gravitation; energy; momentum; electric charge and force; and waves.

SCIE107. Biology (3 credits)
Among the several topics covered in this introductory college-level biology course include evolution, cellular processes, energy and communication, genetics, information transfer, ecology, and system interactions.

SCIE172. Environmental Science (3 credits)
In this course, students study the interrelationships in nature as they learn about energy transfer, interactions between earth systems, interactions between various lifeforms and the environment, and sustainability. Students learn how to analyze environmental concepts and processes to propose meaningful solutions to challenging real-world environmental problems.

SOCS108. US History (3 credits)
In US History, students study the history of the United States from 1491 to present. Among the many topics covered include American and national identity; work, exchange, and technology; migration and settlement; American and regional culture; and America in the world. Through the analysis of primary and secondary sources, students are able to develop historical arguments, make historical connections, and develop important reasoning skills about comparison, causation, and continuity and change.

SOCS111. European History (3 credits)
In this introductory college-level European history course, students cultivate their understanding
of European history through analyzing historical sources and learning to make connections and craft historical arguments. They explore many concepts including the interaction of Europe and the world; economic and commercial developments; cultural and intellectual developments; states and other institutions of power; social organization and development; national and European identity; and technological and scientific innovation.

**SOCS123. World History (3 credits)**
In this course, students cultivate their understanding of world history from around 1200 CE to the present. Students analyze historical sources and learn to make connections and craft historical arguments as they explore concepts that include humans and the environment, cultural developments and interactions, governance, economic systems, social interactions and organization, and technology and innovation.

**SOCS135. Psychology (3 credits)**
In Psychology, students cultivate their understanding of the systematic and scientific study of human behavior and mental processes through inquiry-based investigations. Among the many concepts explored, students learn about the biological basis of behavior, sensation and perception, learning and cognition, motivation, developmental psychology, testing and individual differences, treatment of abnormal behavior, and social psychology.

**Chemistry Courses**

**CHEM123. Introduction to Chemistry (3 credits)**
This course introduces students to the substances that make up our world and the changes these substances undergo. Some of the topics covered include the following: matter and change; atomic and molecular structure; the Periodic Table; states of matter; solutions; chemical reactions; and stoichiometry.

**CHEM130. Basic Chemistry (3 credits)**
In Basic Chemistry, students study matter – element, compounds, molecules, and ions: their composition, structure, properties, behavior, and the changes they undergo during reactions with other substances. Among the many topics covered in this course include atomic structure; intermolecular forces and bonding; chemical reactions; kinetics; thermodynamics; and equilibrium.

**CHEM245. General Chemistry I (3 credits)**
In this course, students learn fundamental chemistry concepts while becoming proficient problem-solvers. Among the concepts studied in this course include classification of matter, the basic building blocks of matter, chemical reactions, properties and laws of gases, and thermochemistry.

**CHEM246. General Chemistry II (3 credits)**
Prerequisite: CHEM245
In General Chemistry II, students will continue to become proficient with the laws and properties of matter. The focus of this course will include the quantum-mechanical model of the atom and the wave-particle duality of light, periodic properties of elements, the Lewis model for chemical bonding, valence bond and molecular orbital theory, liquids, solids, and intermolecular forces, and solutions.

CHEM247. General Chemistry III (3 credits)
Prerequisite: CHEM246
In this course students delve into more advanced chemistry topics. Among the topics focused on in this course, include the following: chemical kinetics, equilibrium and Le Châtelier’s Principle, acids and bases, aqueous ionic equilibrium, and thermodynamics.

CHEM248. General Chemistry IV (3 credits)
Prerequisite: CHEM247
Students completing this chemistry course will have a strong problem-solving abilities together with a solid understanding of the properties and behaviors of matter. Some of the topics covered in this course include the following: radioactivity and nuclear chemistry, organic chemistry, biochemistry, chemistry of non-metals, metals and metallurgy, and transition metals and coordination compounds.

CHEM305. Materials Science I (3 credits)
Prerequisite: CHEM248
The properties of materials provide important information regarding their appropriateness for a specific application and how they will function in service. In this course, students learn the fundamentals of materials science needed to select materials for real-world situations. Students learn to combine theory with practical applications used in today’s machines, devices, structures, and consumer products. The premises of materials science and mechanical behavior are explored for a variety of materials including ferrous and non-ferrous metals; polymers and elastomers; wood and wood products; ceramics and glass; and more.

CHEM306. Materials Science II (3 credits)
Prerequisite: CHEM305
In this course, students continue to learn more about the properties of various materials. The major focus of this course is on mechanical and nondestructive evaluation of material properties. These insights build the groundwork for inspection process and testing techniques, including tensile, creep, compression, shear, bend or flexure, hardness, impact, and fatigue testing. Students are provided a perspective understanding of why we study and test materials and develop the skills in industry-sanctioned testing procedures.

CHEM421. Chemical Processes I (3 credits)
Prerequisites: MATH112, CHEM248
In this course, students bring together their chemistry, physics, and math skills to perform real-world chemical process systems analyses. In this course, the focus is on processes and process variables and material balances for single- and multi-phase systems.

**CHEM422. Chemical Processes II (3 credits)**

*Prerequisite: CHEM421*

In Chemical Processes II, students build upon the understanding gained in Chemical Processes I to include energy balances on nonreactive and reactive as well as transient processes. This course provides students with the relevant foundation needed to be able to solve real-world chemistry-related challenges.

**CHEM611. Advanced Chemistry I (3 credits)**

In this course, students will analyze principles of chemistry on an advanced level and enhance their problem-solving abilities, preparing them to be able to make meaningful contributions to this field of science. As they study recent advances and discoveries in this field, students will evaluate the impact that chemistry has had, and will continue to have, on improving the quality of life. Some of the topics covered include advanced reactions, thermochemistry, VSEPR, intermolecular forces, reaction kinetics, and more.

**CHEM612. Advanced Chemistry II (3 credits)**

*Prerequisite: CHEM611*

In this course, students will continue to analyze principles of chemistry on an advanced level as they enhance their problem-solving abilities. As they study recent advances and discoveries in this field, students will evaluate the impact that chemistry has had, and will continue to have, on improving the quality of life. Some of the advanced topics considered in this course will include equilibrium, thermodynamics, electrochemistry, coordination chemistry, and more.

**CHEM617. Analytical Chemistry I (3 credits)**

In this course, students become proficient with the principles and practices of analytical chemistry as they consider the latest developments in this applied field. Besides learning the current tools of analytical chemistry, in this course, students also gain experience collecting relevant and accurate data, making complex calculations, being mindful of potential errors in their data, and statistical data analysis and evaluation. They develop best practices for sampling, standardization, and calibration. They evaluate and perform calculations on complex systems in chemical equilibrium; perform classical methods of analysis, including gravimetric analysis, complexation and precipitation reactions, and titrations. Students gain real-world context as they consider applications in medicine, industry, and the sciences.

**CHEM618. Analytical Chemistry II (3 credits)**

*Prerequisite: CHEM617*

In this course, students develop a strong understanding of analytical chemistry as they continue to explore the principles and current practices in this applied field. Electrochemical methods; potentiometry; electrogravimetry and coulometry; voltammetry; and various types of
spectrochemical analyses are among the topics explored in this course. Students also gain proficiency using kinetic methods of analyses and analytical separation techniques.

CHEM625. Solid State Materials Chemistry I (3 credits)
In Solid State Materials Chemistry I, students are provided with an integrated treatment of a wide range of materials as they explore the link between structure, defects, bonding, and properties of materials. Among the materials considered in this course include crystalline, amorphous, organic, and nanomaterials. Students consider various synthesis methods, characterization tools, and technological applications to deepen their understanding of materials and their design. A major focus of this course is upon the fundamentals of extended solids.

CHEM626. Solid State Materials Chemistry II (3 credits)
Prerequisite: CHEM625
In this course, students continue to explore properties and classes of materials as they build a coherent framework, and master core concepts. A major focus of this course is upon optical, magnetic, conducting, and magnetotransport materials. Students also study the properties of superconductors, amorphous materials, and more. Students acquire the firm understanding needed to design new materials with defined chemical and physical characteristics.

CHEM643. Classical Thermodynamics for Materials Science I (3 credits)
In this course, students analyze advanced concepts of classical thermodynamics with an emphasis on materials science. A major focus of this course will be to ensure students have a solid, unified understanding of classical thermodynamic principles. In this course thermodynamic equilibria of ideal gas and single-component systems are explored. Solution thermodynamics and statistical mechanics are also considered.

CHEM644. Classical Thermodynamics for Materials Science II (3 credits)
Prerequisite: CHEM643
Building upon the unified understanding of gained in Classical Thermodynamics for Materials Science I, in this course, students delve into more advanced thermodynamic concepts. Students expand their understanding of thermodynamics from the most fundamental principles to non-uniform systems. They learn about coarse graining methods. Students consider the Landau theory along with multi-component instabilities in various types of thermodynamic application, including phase separation and order-disorder transitions. Nucleation theory and spinodal decomposition are considered and many more important topics relevant to materials science.

CHEM651. Pre-Dissertation Applied Research (3 credits, P/D/F)
Offered in the Fall
Advanced problems in any area of experimental or theoretical chemistry, with assigned reading and consultation. Can be repeated for credit.

CHEM652. Pre-Dissertation Applied Research (3 credits, P/D/F)
Offered in the Spring
Advanced problems in any area of experimental or theoretical chemistry, with assigned reading and consultation. Can be repeated for credit.

CHEM667. Chemical Kinetics and Reaction Dynamics I (3 credits)
Students master the principles of kinetics that are essential to understanding chemical processes and to solving modern chemical problems. Among the topics covered in this course include a focus upon various theories of gases and chemical reaction. Students consider relevant real-life examples to gain a strong understanding of these principles.

CHEM668. Chemical Kinetics and Reaction Dynamics II (3 credits)
Prerequisite: CHEM667
In this course, students build upon the foundation gained in Chemical Kinetics and Reaction Dynamics I as they consider how chemical reactions occur and explore how the answer to this question leads to many exciting fields of modern research. Students explore the application of kinetics in more technical applications, including reactions in liquid solutions, surface processes, photochemistry, and reaction dynamics.

CHEM673. Catalysis and Kinetics I (3 credits)
In this advanced course students consider catalysis from a molecular perspective and how it is interwoven with the field of reaction kinetics. Catalysis to explored while emphasizing thermodynamics, physical chemistry, spectroscopy, solid state chemistry, and quantum chemistry. Students learn how to choose the optimal catalyst for specific applications as they become familiar with the requirements of a successful catalyst and best preparation processes.

CHEM674. Catalysis and Kinetics II (3 credits)
Prerequisite: CHEM673
In Catalysis and Kinetics II, students continue studying catalysis for a molecular perspective. In this course, students become expert on surface reactivity and kinetics of reactions on surfaces. In addition, students consider how the world of reacting molecules is important to the real world of industry, including modern-day energy supplies such as gas-to-liquid, coal-to-liquid, biomass conversion, and hydrogen production.

CHEM677. Advanced Analytical Chemistry I (3 credits)
Analytical chemistry today is almost entirely instrumental. It is crucial to applied research in chemistry as well as many other fields of science, including molecular biology, medicine, geology, food science, materials science, and many other fields. It is important that students have a firm understanding of both the uses and the limitations of modern analytical instruments so they can be properly utilized. Major fields of modern instrumentation are covered along with applications of each instrumental technique. Detailed coverage of sampling, sample handling, sample storage, and sample preparation for various instrumental techniques is also discussed. Some of the analytical methods focused on in this course include visible and ultraviolet molecular spectroscopy; infrared, near-infrared, and Raman spectroscopy; magnetic resonance spectroscopy; atomic absorption spectrometry; and atomic emission spectroscopy.
CHEM678. Advanced Analytical Chemistry II (3 credits)

*Prerequisite: CHEM677*

In Advanced Analytical Chemistry II, students continue to explore state-of-the-art instrumental analytical chemistry techniques. A firm understanding of these analyses is crucial to applied research in chemistry as well as many other fields of science, including molecular biology, medicine, geology, food science, materials science, and many other fields. It is important that students have a firm understanding of both the uses and the limitations of modern analytical instruments so they can be properly utilized. Some of the analytical methods focused on in this course include x-ray spectroscopy; mass spectrometry; gas chromatography; chromatography with liquid mobile phases; electroanalytical chemistry; and various types of thermal analyses.

CHEM681. MATLAB I (3 credits)

In this course, students become skilled using MATLAB, a high-performance programming platform designed specifically for scientists to analyze and design systems and products that transform our world. MATLAB allows students to take their ideas from research to production. MATLAB helps students become proficient in quantitative thinking, a critical skill for every graduate student. In addition, MATLAB helps students access, visualize, and analyze data, and develop the skills required to accomplish these tasks. MATLAB brings together a knowledge of chemistry and computational skills—two critically important components required for many applied research projects.

CHEM682. MATLAB II (3 credits)

*Prerequisite: CHEM681*

In MATLAB II, students continue to refine their skills programming in MATLAB. Students can use MATLAB in their applied research projects to analyze data, develop algorithms, and create models and applications. MATLAB allows students to take their ideas from research to production by deploying to enterprise applications and embedded devices. MATLAB helps students become proficient in quantitative thinking, a critical skill for every graduate student. MATLAB brings together a knowledge of chemistry together with computational skills, two important components required for many applied research projects. In this course, students learn more advanced MATLAB topics for problem-solving, including data transfer; object-oriented programming; image and sound processing; and more.

Cyber Security Courses

CYBR102. CompTIA Network+ I (3 credits)

In CompTIA Network+ I, students explore the basics of Ethernet and TCP/IP networking as they learn how and why networking technologies are used. Some of the concepts addressed in this course include computer networking basics; physical layer cabling; wireless networking; interconnecting LANs; TCP/IP networking; and switch configurations. Students gain competency as they develop hands-on skills through practical exercises that reinforce the concepts learned.
CYBR103. CompTIA Network+ II (3 credits)
Prerequisite: CYBR102
In CompTIA Network+ II, students build upon the knowledge gained in CompTIA Network+ I, exploring more advanced concepts in Ethernet and TCP/IP networking. Some of the many concepts covered in this course include router configuration and protocols; internet technologies; troubleshooting; network security; cloud computing and virtualization; and more. As students proceed through this course, they explore real-world examples and complete practical, hands-on exercises, reinforcing the concepts and guiding them as they configure, analyze, and fix networks. Upon completion of this course, students should be well-prepared to take the CompTIA Network+ certification exam.

CYBR253. Computer Security Fundamentals I (3 credits)
In this course, students are introduced to core concepts and terminology important to the field of cyber security. After being introduced to computer security, students learn important network and Internet basics and then explore different types of web attacks and methods for counteracting them. They learn the practical skills needed to identify and prioritize potential network threats and use basic networking knowledge to improve security. Students learn best practices and new industry trends as well as the state-of-the-art in both attacks and defense. A hands-on learning approach is used to help students apply their learning and deepen their understanding.

CYBR254. Computer Security Fundamentals II (3 credits)
Prerequisite: CYBR253
In Computer Security Fundamentals II, students continue to learn about computer security and the challenges, technologies, and skills needed for success in this field. They learn a proactive, realistic approach for assessing today’s latest threats and implementing countermeasures. Topics covered in this course include encryption; computer security technology; security policies; network and vulnerability scanning; cyber terrorism and information warfare; and more. Students learn best practices and new industry trends along with the state-of-the-art in both attacks and defense. A hands-on learning approach is used to help students apply their learning and deepen their understanding.

CYBR262. The Trusted Internet (3 credits)
Prerequisite: CYBR254
In this course, students gain a fundamental understanding of b² cryptography. Utilizing portable security tokens connected in a hierarchical structure, this industry disruptive technology has solved the problem of securely exchanging encryption keys, even over a hostile public network.

CYBR264. CyberID, User Authentication and Credentials (3 credits)
Prerequisite: CYBR264
Authentication means verifying the identity of someone who wants to use data, a resource, or an application. Validating that identity establishes a trust relationship for future interactions. Authentication enables accountability by making it possible to link access and actions to specific identities. After authentication, authorization processes can allow or limit the levels of access and action permitted to that user. In this course, students learn about authentication and the importance of a cyberidentity. Students learn the benefits of having a CyberID, several places
where a cyberidentity could be deployed, and other critical circumstances in which one is badly needed and highly recommended.

**CYBR267. Penetration Testing I (3 credits)**  
*Prerequisite: CYBR254*  
Penetration testing is a security exercise in which a cyber security expert attempts to find and exploit vulnerabilities in a computer system. The purpose of this simulated attack is to identify any weak spots in a system's defenses which attackers could exploit. In Penetration Testing I, students are introduced to the key concepts, terminology, challenges, tools, and skills needed to perform penetration testing. Students learn the latest penetration standards from NSA, PCI, and NIST. In addition, students explore the basics of cryptography; perform reconnaissance; test for vulnerabilities in Window; perform penetration testing on websites and web communications; recognize SQL injection and cross-site scripting attacks; and more.

**CYBR268. Penetration Testing II (3 credits)**  
*Prerequisite: CYBR267*  
In Penetration Testing II, students continue to explore the penetration testing life cycle from planning to reporting, integrating theory and practice to further hone their penetration testing abilities. Among the topics covered in this course include identifying Linux vulnerabilities and password cracks; using Kali Linux for advanced penetration testing; and testing various environments using Metasploit. Students gain practical understanding as they complete their own penetration test project.

**CYBR377. Advanced Cyber Security Practices I (3 credits)**  
*Prerequisite: CYBR254*  
In Advanced Cyber Security Practices I, students learn best practices, governance frameworks, and key standards for cyber security. Students learn how to establish effective cyber security in any organization. Topics include defining and developing workable cyber security policies; adopting a cyber security framework for governing them; risk management; asset management and data loss prevention; function alignment from human relations to physical security; best practices for securing communications and operations; and more.

**CYBR378. Advanced Cyber Security Practices II (3 credits)**  
*Prerequisite: CYBR377*  
In Advanced Cyber Security Practices II, students continue to learn best practices for establishing effective cyber security in an organization. Some of the topics covered in this course include access control management; acquisition, development, and maintenance of technology; incidence response; and compliance in finance and healthcare, the PCI DSS standard, and the NIST Cybersecurity Framework.

**CYBR462. Linux Essentials I (3 credits)**  
In Linux Essentials I, students are presented with an introduction to the basics of the Linux command line. Linux is deployed extensively in various industries for diverse functions including
web servers, firewalls, and graphic design. It provides robust functionality and a stable, secure environment. After becoming familiar with the basics, students learn best practices for securely managing user and group accounts. They also learn about file permissions and essential and advanced concepts associated with managing local storage. They learn how to use Linux commands and scripting to automate specific tasks. Throughout this course, students learn the importance of security policies and how to develop them to mitigate security risks.

**CYBR463. Linux Essentials II (3 credits)**
*Prerequisite: CYBR462*
In Linux Essentials II, students continue their study of Linux, gaining proficiency using the Linux command line concepts. In this course, students learn how to protect systems, even in cases in which one or more layers are penetrated. Students master powerful tools and automated scripting techniques for footprinting, penetration testing, threat detection, logging, auditing, software management, and more. Students completing this course will be cognizant of the key concepts and skills covered in the CompTIA Linux and LPIC-1 industry certification exams.

**CYBR483. Network Defense and Countermeasures I (3 credits)**
*Prerequisite: CYBR254*
Firewalls, security protocols, and encryption sometimes fall short when attempting to stop intruders from accessing private data. In this course, students learn important underlying principles and techniques for defending modern computer networks. Students are thoroughly introduced to the core technologies of modern network security, including firewalls, intrusion-detection systems, and VPNs. Students learn to evaluate key network risks and dangers; to select the right network security approach for an organization; to anticipate and counter widespread network attacks; to successfully deploy and apply firewalls and intrusion detection systems; to secure network communication with virtual private networks; to protect data with modern encryption methods; and more. Theory and application are blended throughout to help students understand what to do and why.

**CYBR484. Network Defense and Countermeasures II (3 credits)**
*Prerequisite: CYBR483*
In this course, students continue to learn techniques for defending computer networks. They learn defense tactics that can be used to defend against malware, including ransomeware, Trojan horses, and spyware and how to define and implement security policies to reduce cyber risk. In addition, they will explore leading security standards and models; know how to prepare for an investigation should their network be attacked; as well as understand the growing risks of espionage and cyberterrorism. Hands-on activities deepen understanding and help students learn how to apply the theoretical information they have acquired.

**CYBR515. Applied Incident Response I (3 credits)**
Incident response is critical for the active defense of any network. In this course, students are readied with up-to-date, immediately applicable tactics that can be used to engage the adversary. Students master effective techniques they can use to respond to advanced attacks
against local and remote network resources. In this course, students learn how to prepare the environment for effective incident response along with various techniques to respond and guard against cyberattacks.

**CYBR516. Applied Incident Response II (3 credits)**
*Prerequisite: CYBR515*
In Applied Incident Response II, students continue to learn up-to-date, immediately applicable tactics that can be used for cyber incident response. Students are armed with additional proven response techniques together with a framework through which to apply them. In this course, students learn more techniques to respond and guard against cyberattacks and how they can strengthen cyber security within an organization by continually improving preventive and detective controls.

**CYBR527. Advanced Cyber Security Policies I (3 credits)**
In this course, students learn how to build effective cybersecurity programs and policies for an enterprise. Students consider best practices, analyze governance frameworks, and key standards. Cyberattacks can place entire organizations at risk. To implement an effective cybersecurity program requires everyone in an organization to work together – from leaders down. Students are provided professional start-to-finish guidance for establishing effective cyber security in any organization. Students are presented proven best practices for defining policy and governance, ensuring compliance, and collaborating to harden the entire organization. Topics included in this course include cybersecurity policies and framework development; risk and asset management; data loss prevention; and much more.

**CYBR528. Advanced Cyber Security Policies II (3 credits)**
*Prerequisite: CYBR527*
In Advanced Cyber Security Policies II, students continue to learn how to build effective cybersecurity programs and policies for an enterprise. Students consider best practices, analyze governance frameworks, and key standards. Students are provided professional start-to-finish guidance for establishing effective cyber security in any organization. Topics included in this course include best practices for securing communications, operations, and access; acquiring, developing, and maintaining technology; responding to incidents; healthcare, finance, and PCI DSS compliance; and more.

**CYBR545. Cybersecurity Analyst I (3 credits)**
This course is the first of a two-part series to prepare students with both the conceptual knowledge and hand-on skills required to become a certified CompTIA Cybersecurity Analyst (CySA). Topics covered in this course include vulnerability management activities; implementing controls to mitigate attacks and software vulnerabilities; security solutions for infrastructure management; software and hardware assurance best practices; and more.

**CYBR546. Cybersecurity Analyst II (3 credits)**
*Prerequisite: CYBR545*
This course is the last course in a two-part series to help students master the concepts and techniques required to become a certified CompTIA Cybersecurity Analyst (CySA). Additional topics covered in this course include understanding and applying the appropriate incident response; applying security concepts in support of organizational risk mitigation; frameworks, policies, and procedures; and more. Students completing this course should be well-prepared with the conceptual knowledge and hands-on skills required to pass the CompTIA CySA industry-recognized certification exam.

**CYBR588. Certified Information Systems Security Professional I (3 credits)**
In this 2-course series, students are prepared with the conceptual understanding and practical skills needed to become a Certified Information Systems Security Professional (CISSP). Topics covered in this course include security and risk management; asset security; security architecture and engineering; and more.

**CYBR589. Certified Information Systems Security Professional II (3 credits)**
*Prerequisite: CYBR588*
In the final course of this 2-course series, students continue to prepared with the conceptual understanding and practical skills needed to become a Certified Information Systems Security Professional (CISSP). Topics covered in this course include communication and network security; identity and access management; security assessment and testing; security operations; software development security; and more. Students completing this course should be well-prepared with the knowledge and applied skills required to pass the CISSP industry-recognized certification exam.

**CYBR615. Applied Incident Response I (3 credits)**
Incident response is critical for the active defense of any network. In this course, students are readied with up-to-date, immediately applicable tactics that can be used to engage the adversary. Students master effective techniques they can use to respond to advanced attacks against local and remote network resources. In this course, students learn how to prepare the environment for effective incident response along with various techniques to respond and guard against cyberattacks.

**CYBR616. Applied Incident Response II (3 credits)**
*Prerequisite: CYBR615*
In Applied Incident Response II, students continue to learn up-to-date, immediately applicable tactics that can be used for cyber incident response. Students are armed with additional proven response techniques together with a framework through which to apply them. In this course, students learn more techniques to respond and guard against cyberattacks and how they can strengthen cyber security within an organization by continually improving preventive and detective controls.

**CYBR627. Advanced Cyber Security Policies I (3 credits)**
In this course, students learn how to build effective cybersecurity programs and policies for an enterprise. Students consider best practices, analyze governance frameworks, and key standards. Cyberattacks can place entire organizations at risk. To implement an effective cybersecurity program requires everyone in an organization to work together – from leaders down. Students are provided professional start-to-finish guidance for establishing effective cybersecurity in any organization. Students are presented proven best practices for defining policy and governance, ensuring compliance, and collaborating to harden the entire organization. Topics included in this course include cybersecurity policies and framework development; risk and asset management; data loss prevention; and much more.

**CYBR628. Advanced Cyber Security Policies II (3 credits)**

*Prerequisite: CYBR627*

In Advanced Cyber Security Policies II, students continue to learn how to build effective cybersecurity programs and policies for an enterprise. Students consider best practices, analyze governance frameworks, and key standards. Students are provided professional start-to-finish guidance for establishing effective cybersecurity in any organization. Topics included in this course include best practices for securing communications, operations, and access; acquiring, developing, and maintaining technology; responding to incidents; healthcare, finance, and PCI DSS compliance; and more.

**CYBR645. Cybersecurity Analyst I (3 credits)**

This course is the first of a two-part series to prepare students with both the conceptual knowledge and hands-on skills required to become a certified CompTIA Cybersecurity Analyst (CySA). Topics covered in this course include vulnerability management activities; implementing controls to mitigate attacks and software vulnerabilities; security solutions for infrastructure management; software and hardware assurance best practices; and more.

**CYBR646. Cybersecurity Analyst II (3 credits)**

*Prerequisite: CYBR645*

This course is the last course in a two-part series to help students master the concepts and techniques required to become a certified CompTIA Cybersecurity Analyst (CySA). Additional topics covered in this course include understanding and applying the appropriate incident response; applying security concepts in support of organizational risk mitigation; frameworks, policies, and procedures; and more. Students completing this course should be well-prepared with the conceptual knowledge and hands-on skills required to pass the CompTIA CySA industry-recognized certification exam.

**CYBR651. Pre-Dissertation Applied Research (3 credits, P/D/F)**

*Offered in the Fall*

Advanced problems in any area of experimental or theoretical cyber security, with assigned reading and consultation. Can be repeated for credit.
CYBR652. Pre-Dissertation Applied Research (3 credits, P/D/F)

*Offered in the Spring*

Advanced problems in any area of experimental or theoretical cyber security, with assigned reading and consultation. Can be repeated for credit.

CYBR663. Advanced Penetration Testing I (3 credits)

In this course, students learn advanced techniques for building a strong defense against motivated, organized, professional cyberattacks. Featuring techniques not commonly covered by defensive scanners, this course integrates social engineering, programming, and vulnerability exploits into a multi-disciplinary approach for targeting and compromising high security environments. From discovering and creating attack vectors, and moving unseen through a target enterprise, to establishing command and exfiltrating data – even from organizations without a direct Internet connection – this course contains the critical techniques that provide a more accurate picture of a system’s defense.

CYBR664. Advanced Penetration Testing II (3 credits)

*Prerequisite: CYBR663*

In this course, students continue to learn advanced techniques for building a strong defense against motivated, organized, professional cyberattacks. Typical penetration testing consists of low-level hackers attacking a system with a list of known vulnerabilities and defenders preventing those hacks using an equally well-known list of defensive scans. Professional hackers on the forefront of today’s threats operate at a much more complex level. In this course, students learn how to defend high security networks.

CYBR675. Industrial Cyber Security I (3 credits)

With industrial control systems (ICS) expanding into traditional IT space and even into the cloud, the attack surface of ICS environments has increased significantly, making it crucial for organizations to be aware of their ICS vulnerabilities and implement advanced techniques for monitoring and defending against rapidly evolving cyber threats to critical infrastructure. In this hands-on course, students explore ICS cybersecurity monitoring tasks, activities, tools, and best practices. Some of the topics covered in this course include modern ICS architecture; the Industrial Demilitarized Zone (IDMZ); secure ICS architecture designs; security monitoring; and industrial threat intelligence.

CYBR676. Industrial Cyber Security II (3 credits)

*Prerequisite: CYBR675*

In this course, students build upon the foundation gained in Industrial Cyber Security I. In this hands-on course, students continue to explore ICS cybersecurity monitoring tasks, activities, tools, and best practices. Topics covered will include threat hunting; cyber security assessments; ICS risk assessments; penetration testing ICS environments; incident response for ICS environments; and more.

CYBR683. Real-World Cryptography I (3 credits)
Cryptography is the essential foundation of IT security. To stay ahead of the bad actors attacking computer systems, students need to understand the tools, frameworks, and protocols that protect networks and applications. A major focus of this course will be on cryptographic primitives and common algorithms frequently used to build cryptographic protocols for computer security systems.

**CYBR684. Real-World Cryptography II (3 credits)**
*Prerequisite: CYBR683*
Building upon the foundation provided in Real-World Cryptography I, student continue to learn cryptographic techniques that drive the security of web APIs, registering and logging in users, and the blockchain. This firm understanding will provide them with the requisite knowledge to be able to make excellent security choices for systems and applications. A major focus of this course is on cryptographic protocols. The future of cryptography is also considered, including cutting-edge advances such as cryptocurrencies and post-quantum cryptography.

**CYBR688. Certified Information Systems Security Professional I (3 credits)**
In this 2-course series, students are prepared with the conceptual understanding and practical skills needed to become a Certified Information Systems Security Professional (CISSP). Topics covered in this course include security and risk management; asset security; security architecture and engineering; and more.

**CYBR689. Certified Information Systems Security Professional II (3 credits)**
*Prerequisite: CYBR688*
In the final course of this 2-course series, students continue to prepared with the conceptual understanding and practical skills needed to become a Certified Information Systems Security Professional (CISSP). Topics covered in this course include communication and network security; identity and access management; security assessment and testing; security operations; software development security; and more. Students completing this course should be well-prepared with the knowledge and applied skills required to pass the CISSP industry-recognized certification exam.

**E-Learning Courses**

**ELRN101. Introduction to E-Learning (3 credits)**
In this course, students learn about various types of e-learning programs, how they differ from one another and from the traditional classroom learning experience.

**ELRN106. Deployment Options for E-Learning (3 credits)**
*Prerequisite: ELRN101*
IST students examine some of the many different ways that e-learning can be used to facilitate
learning. Both online and blended learning environments are discussed, as well as other implementations of e-learning technology proven to enhance the learning process.

ELRN127. E-Learning Teaching Tools for Engagement and Impact (3 credits)
Prerequisite: ELRN101
Topics covered in this course include an introduction to courseware development and recovery features built into the technology systems. Recovery systems to support student learning, helping them master the material and continue making forward progress in their studies is a major focus. Students learn the various features of the Acellus Learning System student interface and how it can be used to maximize learning.

ELRN133. Learning Management System (LMS) Configuration (3 credits)
Prerequisite: ELRN101
Students learn best practices and the various ways teachers can manage and assign students to various classes in an online environment. The course includes the basics of LMS configuration and how to effectively implement class systems. Practice includes learning about the various parameters needed to set up an Acellus class.

ELRN153. Technology and Media for Learning (3 credits)
In this course, students learn effective strategies for integrating a range of technology and media formats into the PK-12 classroom that can be used to support and enhance teaching and learning. Everyday teaching challenges are explored together with practical solutions for incorporating technology and media into the classroom. Students learn about recent innovations in technology and media, including social media, copyright issues, coding as literacy, transdisciplinary learning, artificial intelligence, and augmented reality. Students consider appropriate technology that aligns with content standards while meeting the learning needs of all students.

ELRN221. Techniques for Importing Students into an LMS (3 credits)
Prerequisite: ELRN133
Students gain proficiency as they implement best practices for importing students. Students study various techniques to compare and contrast as they become familiar and practice several different methods for importing and transferring students into an Acellus school – either one student at a time or several at once.

ELRN225. Learning with Technology I (3 credits)
In Learning with Technology I, students take a practical look at the knowledge and skills needed to effectively and efficiently integrate technology into the digital classroom. Topics covered include technology standards for 21st century learning; technology challenges and opportunities; technology and learning; planning for technology integration; technologies in the digital classroom; software for teaching and learning; and more.

ELRN226. Learning with Technology II (3 credits)
Prerequisite: ELRN225
In this course, students continue to explore a range of educational technologies available for use in today’s classroom, and many ways they can be effectively deployed to enhance teaching and learning. Some of the topics covered in this course include technology for diverse learners; the web in the digital classroom; technology for digital learning and delivery; technology implementation issues in schools; evolving and emerging educational technologies; and adapting to the technological changes anticipated in classrooms of the future. Upon completion of this course, students will be prepared with the competencies needed to integrate technology into the digital classrooms.

ELRN229. Effective Strategies for Monitoring Students Online (3 credits)
Prerequisite: ELRN133
The primary focus of this course is the study of how to monitor students in an online environment. Students explore how monitoring students can be used to leverage teachers, providing in-the-moment details on the status of each of their students, alerting them to those in greatest need of their timely assistance. Practice includes the Acellus Live Class Monitoring System.

ELRN263. Using Intervention Strategies in the Learning Process (3 credits)
Prerequisite: ELRN133
In this course, various effective learning interventions are studied related to maximizing student learning. Students are introduced to Vectored Instruction and learn what it is and how it works to provide immediate targeted remediation, enabling students to strengthen their educational foundation as they move forward in their studies.

ELRN274. Applying Strategies of the Success Zone Model (3 credits)
Prerequisite: ELRN133
Students learn what the concept of Success Zone is and its importance in student success development. Students learn what they can do as a teacher in various situations to help students get into their Success Zone so they can begin making steady positive progress in their learning.

ELRN363. Multimedia Learning I (3 credits)
In this course, students explore the potential of multimedia instruction as a means of promoting human learning. Topics covered in this course include the science of learning, instruction, assessment, the multimedia principle, and more.

ELRN364. Multimedia Learning II (3 credits)
Prerequisite: ELRN363
In Multimedia Learning II, students continue to learn how to improve education by using well-designed multimedia instruction. In this course, students examine several key principles for reducing extraneous processing in multimedia content and for managing essential processing in
multimedia learning. These research-based principles of multimedia instructional design are grounded in cognitive theory of how people learn from words and graphics.

**ELRN365. Multimedia Learning III (3 credits)**

*Prerequisite: ELRN364*

In this course, students continue to expand their understanding of how multimedia content can be used to enhance student learning. A major focus of this course is upon principles for fostering generative processing in multimedia learning and bringing together the various principles into best practices for effective multimedia design implementations.

**ELRN398. Acellus Learning Accelerator I (3 credits)**

In this course, students consider a state-of-the-art asynchronous learning system, results achievable with e-learning systems, and best practices for using them to improve student learning outcomes.

**ELRN399. Acellus Learning Accelerator II (3 credits)**

*Prerequisite: ELRN398*

In Acellus Learning Accelerator II, students learn the science behind this video-based learning system and some of the many methodologies employed to help students learn.

**ELRN400. Acellus Learning Accelerator III (3 credits)**

*Prerequisite: ELRN399*

In this course, students become involved in creating effective instruction for an online learning system as they learn best practices for e-learner engagement.

**ELRN401. Acellus Learning Accelerator IV (3 credits)**

*Prerequisite: ELRN400*

In this course, students become proficient with a state-of-the-art learning management system, and using it to improve student outcomes.

**ELRN501. E-Learning Principles and Practice (3 credits)**

In E-Learning Principles and Practices, participants in this program are introduced to e-learning and asynchronous online instruction. As part of this course, participants attend a 3-day Acellus-certified Administrator Training in which they gain the expertise and insights necessary to administer Acellus in a school setting and train other educators in the effective use of this learning platform.

**ELRN505. Configuration Best Practices for E-Learning LMS (3 credits)**

*Prerequisite: ELRN501*

In this course, program participants become proficient configuring, using, and managing a state-of-the-art e-learning LMS.

**ELRN507. Best Practices in Teaching Over the Internet (3 credits)**
Prerequisite: ELRN505
Teaching over the Internet comes with its own set of unique challenges as the teacher must now play a new role to ensure the success of their self-directed e-learning students. In this course, participants in this program learn from numerous best practices for supporting their e-learners and helping them flourish in this new learning environment.

ELRN509. Motivation and Empowerment Strategies for Enhancing Student Outcomes (3 credits)
Prerequisite: ELRN505
Participants in this program learn about the principles and philosophies behind the Success Zone. They become proficient at analyzing Performance Reports and using them to get e-learners into their Success Zone where they are making steady, consistent progress in their learning.

ELRN511. Designing Effective Feedback and Intervention Processes (3 credits)
Prerequisite: ELRN505
Vectored Instruction has proven to be an extremely effective remediation tool, helping struggling students acquire the needed foundation so they can begin making meaningful progress in their grade-level studies. In this course, participants in this program are introduced to the principles behind Vectored Instruction and many of the other recovery features integrated into Acellus and how these features work together to improve student outcomes.

ELRN512. Principles Behind Writing Meaningful Assessments (3 credits)
Prerequisite: ELRN501
In this course, program participants learn the principles behind writing meaningful assessments – assessments that are written for the intended audience and clearly and concisely convey and measure student comprehension. After mastering these key principles, participants apply them as they create their own original assessments. These assessments are published and then utilized by actual e-learning students. E-learner student data for these assessments is later analyzed for effectiveness.

ELRN521. E-Learning and the Science of Instruction I (3 credits)
e-Learning continues to grow as an alternative or addition to the classroom, and correspondingly, has become a focus among researchers in learning-related fields. New findings from research can inform the design and development of e-learning. In this course, students evaluate the latest evidence and are able to translate the theoretical into the practical. In this course, program participants analyze the latest research, design principles, best practices for providing effective and efficient instruction at a distance.

ELRN522. E-Learning and the Science of Instruction II (3 credits)
Prerequisite: ELRN521
In this course, participants in this program continue to delve into cutting-edge research pertaining to how e-learners best learn. Participants analyze the latest e-learning research;
learn best practices for effectively communicating information; explore evidence-based techniques to engage e-learners; apply evidence-based design techniques to optimize instruction; and more.

**ELRN611. Distance Learning I (3 credits)**

In this course, participants learn e-learning principles and best practices. They learn how to best deploy an e-learning system to meet their specific needs. They also learn techniques utilized to maximize effective learning for every student.

**ELRN612. Distance Learning II (3 credits)**

*Prerequisite: ELRN611*

In this course, participants learn how to create effective and engaging content and utilize the power of feedback to improve learning effectiveness.

**ELRN621. E-Learning and the Science of Instruction I (3 credits)**

e-Learning continues to grow as an alternative or addition to the classroom, and correspondingly, has become a focus among researchers in learning-related fields. New findings from research can inform the design and development of e-learning. In this course, program participants evaluate the latest evidence and are able to translate the theoretical into the practical. In this course, participants analyze the latest research, design principles, best practices for providing effective and efficient instruction at a distance.

**ELRN622. E-Learning and the Science of Instruction II (3 credits)**

*Prerequisite: ELRN621*

In this course, program participants continue to delve into cutting-edge research pertaining to how e-learners best learn. Participants analyze the latest e-learning research; learn best practices for effectively communicating information; explore evidence-based techniques to engage e-learners; apply evidence-based design techniques to optimize instruction; and more.

**ELRN633. Strategies for Boosting Cognitive Engagement I (3 credits)**

In this course, program participants explore current research and reflect on techniques that can be used to transform learning in the classroom from passive knowledge consumption to a culture of thinking in which there is active learning and engagement. Participants focus on essential 21st century skills – from critical thinking and problem-solving to teamwork and creativity. Participants analyze teacher-tested instructional strategies for fostering student engagement and nurturing cognitive abilities.

**ELRN634. Strategies for Boosting Cognitive Engagement II (3 credits)**

*Prerequisite: ELRN633*

In Strategies for Boosting Cognitive Engagement II, program participants continue to analyze current research on critical thinking and cognitive engagement and the relationship that exists between them. They evaluate various teaching strategies together with their new knowledge of critical thinking and cognitive skills, to build a thinking culture in the classroom.
ELRN651. Pre-Dissertation Applied Research (3 credits, P/D/F)
Offered in the Fall
Advanced problems in any area of experimental or theoretical e-Learning, with assigned reading and consultation. Can be repeated for credit.

ELRN652. Pre-Dissertation Applied Research (3 credits, P/D/F)
Offered in the Spring
Advanced problems in any area of experimental or theoretical e-Learning, with assigned reading and consultation. Can be repeated for credit.

ELRN667. Designing Effective Instruction I (3 credits)
In this course, program participants gain the insights and practical skills needed for successful instructional design. Participants analyze techniques for designing effective and efficient instruction that is both exciting and interesting. Participants evaluate recent research that incorporates both behavioral and cognitive approaches into the model. They are presented a flexible model for designing effective instruction based upon research from many disciplines. In this course, participants study instructional design principles to help them develop a solid foundation in the design process. These basic skills can be adapted to a wide variety of settings, including multimedia, classroom, business, higher education, and e-learning instruction.

ELRN668. Designing Effective Instruction II (3 credits)
Prerequisite: ELRN667
In Designing Effective Instruction II, program participants continue to reflect upon the most recent research and trends in instructional design. Participants become proficient in the design of quality instruction that motivates the learner. A major focus of this course is upon design considerations for effective instruction; learning and instructional theories; planning for instructional implementation; and instructional design project management.

ELRN671. Paths of Student Engagement I (3 credits)
In this course, program participants analyze research that delves into the what, why, and how of learner engagement. Participants learn why active engagement is a new frontier of the student achievement and how to use research-based strategies to promote this engagement in their classroom and build a foundation for learner growth. They consider important theories that cast new light on engagement and motivation.

ELRN672. Paths of Student Engagement II (3 credits)
Prerequisite: ELRN671
In this course, program participants build upon the concepts learned in Paths of Student Engagement I as they continue to analyze research that delves into the what, why, and how of learner engagement. Participants learn additional research-based obstacles to student
engagement and ways to overcome them. Participants reflect upon various methods that can be used to take the theory learned and turn it into practice in their classrooms.

**ELRN675. The Science of Learning I (3 credits)**
In The Science of Learning I, program participants focus on how to help learners learn as effectively and efficiently as possible. Participants delve into the world of research to understand what helps learners learn. Participants reflect upon key issues including cognitive-load theory, well-being, and performing well under exam pressure.

**ELRN676. The Science of Learning II (3 credits)**
*Prerequisite: ELRN675*
In this course, program participants build upon the principles learned in The Science of Learning I as they focus on additional ways to help learners learn as effectively and efficiently as possible. Participants continue to analyze the most important and influential studies to date on the topic of learning so they can improve how their learners think, feel, and behave in school. Participants reflect upon this research and consider implications in practice.

**ELRN685. Learning Theories I (3 credits)**
In Learning Theories I, program participants take a comprehensive look at the key theoretical principles, concepts and research findings pertaining to learning, and reflect upon how they can apply these concepts and principles in their classrooms. Topics covered in this course include the relationship between learning theory and instruction; the neuroscience of learning; behaviorism; social cognitive theory; information processing theory; and more.

**ELRN686. Learning Theories II (3 credits)**
*Prerequisite: ELRN685*
In this course, program participants build upon the concepts learned in Learning Theories I as they continue to take a comprehensive look at the key theoretical principles, concepts and research findings pertaining to learning, and reflect upon how they can apply these concepts and principles in their classrooms. Topics covered in this course include cognitive learning processes; constructivism; motivation; self-regulated learning; contextual influences and more.

**Electrical Engineering and Computer Science Courses**

**EECS104. Computer Science Principles (3 credits)**
Computer Science Principles is an introductory computing course that introduces students to the field of computer science. Students learn to design and evaluate solutions and to apply computer science to solve problems. They use data to discover new knowledge. Students learn how computing innovations and computing systems work and explore their potential impacts.
EECS105. Intro to Computer Science (3 credits)
In this course, students learn and practice skills of designing, developing, and analyzing their own computer programs. Among the many topics covered include program design and development; code logic; implementation of program code; and code testing. Ethical and social implications of computer usage is also discussed.

EECS126. HTML5 and CSS (3 credits)
In this hands-on course, students learn the basics of web design. They learn how the web and web pages work and build steadily from there. In this course, students focus on HTML5 and CSS. Students learn how to build HTML pages with text, links, images, tables, and forms. Students become proficient with all of the common HTML tags used to structure HTML pages and are able to create HTML tables and present tabular data efficiently. In addition, they learn how to use style sheets for colors, backgrounds, formatting text, page layout, and for simple animation effects.

EECS127. JavaScript (3 credits)
Prerequisite: EECS126
In JavaScript, students continue to learn the most common web development tasks. By the end of this course, students will have the practical skills needed to design, create, and maintain professional websites. Students learn how JavaScript works and why this language is so important in web design. Students learn how to use JavaScript to build dynamic, interactive web pages. They become proficient with JavaScript programming fundamentals and basic object-oriented concepts using the latest JavaScript syntax. The learn how to use JavaScript libraries, such as jQuery, and how to make sites easy to maintain and update. The concepts learned lay the foundation for using JavaScript in any environments.

EECS232. CSS with Tailwind I (3 credits)
Prerequisite: EECS126
CSS can be hard to debug, complicated to write and hard to maintain. Tailwind helps to minimize the amount of CSS they need to write, making it much easier to control and to debug while still enjoying full flexibility and consistency across the site. Tailwind CSS is an exciting new CSS framework that allows developers to quickly and efficiently design web sites by composing simple utility classes to create complex effects. In this course, students learn the basics of Tailwind as they start by designing the typographical details of the individual elements and then placing and manipulating those elements in “the box” – the rectangular space each element takes up on the screen – using a flexbox or grid design.

EECS233. CSS with Tailwind II (3 credits)
Prerequisite: EECS232
In this course, students build up the skills and understanding acquired in CSS with Tailwind I as they learn more advanced Tailwind features. By the end of this course, students will be able to move elements around the page using animations and transitions and to design complex page
layouts. They will also learn how to create responsive designs that adjust to different screen widths and how Tailwind can be customized to change defaults, add new behavior, or integrate with legacy CSS.

**EECS245. React JavaScript I (3 credits)**

*Prerequisite: EECS127*

Widely used by large and established companies as well as new startups, React is today’s most popular front-end JavaScript library in the field of web development. React enables web developers to build fast, interactive user interfaces for web and mobile applications. After being introduced to React fundamentals, students will begin building their own impressive, high-performing apps as they learn begin using the various components of React, styling React, and even creating complex components using this powerful web framework.

**EECS246. React JavaScript II (3 credits)**

*Prerequisite: EECS245*

As far as new web frameworks and libraries go, React is extremely successful. Besides addressing some of the most common problems faced by developers as they build complex apps, integrated into React are additional features that enable developers to easily build visuals for their apps. In this course, students continue to expand their React programming abilities as they explore the component lifecycle; build multi-page apps using routing and views; optimize React workflow; and learn how to easily manage app data and state.

**EECS357. Cassandra I (3 credits)**

*Prerequisite: EECS127*

Apache Cassandra is a high performance, distributed NoSQL database system excellent at handling huge volumes of records across multiple servers. It is easily scalable to meet a sudden increase in demand by deploying multi-node Cassandra clusters as well as high availability requirements. In this applied course, students learn about the distributed, decentralized structure of Cassandra and the advantages of Cassandra’s nonrelational design. Students gain proficiency at using Cassandra’s query language and the CQL shell. They also create a working data model and compare it with an equivalent relational model.

**EECS358. Cassandra II (3 credits)**

*Prerequisite: EECS357*

In this course, students continue to develop proficiency with Cassandra, a NoSQL database. NoSQL databases can handle extremely large amounts of data, have a simple API, can be easily replicated, are practically schema-free, and are fairly consistent. Since data structures used in a NoSQL database are very different from those used in relational database, NoSQL database operations are much faster. In this course, students become proficient at using Cassandra as they develop sample applications using client drivers, explore cluster topology, and learn how nodes exchange data.
EECS462. Linux Essentials I (3 credits)
In Linux Essentials I, students are presented with an introduction to the basics of the Linux command line. Linux is deployed extensively in various industries for diverse functions including web servers, firewalls, and graphic design. It provides robust functionality and a stable, secure environment. After becoming familiar with the basics, students learn best practices for securely managing user and group accounts. They also learn about file permissions and essential and advanced concepts associated with managing local storage. They learn how to use Linux commands and scripting to automate specific tasks. Throughout this course, students learn the importance of security policies and how to develop them to mitigate security risks.

EECS463. Linux Essentials II (3 credits)
Prerequisite: EECS462
In Linux Essentials II, students continue their study of Linux, gaining proficiency using the Linux command line concepts. In this course, students learn how to protect systems, even in cases in which one or more layers are penetrated. Students master powerful tools and automated scripting techniques for footprinting, penetration testing, threat detection, logging, auditing, software management, and more. Students completing this course will be cognizant of the key concepts and skills covered in the CompTIA Linux and LPIC-1 industry certification exams.

EECS481. Golang I (3 credits)
Prerequisite: EECS358
Golang (also known as Go) is rapidly becoming the preferred language for building web services. In this course, students are provided the essential background needed to think like a Go developer, and write clear and idiomatic Go code. Topics include primitive types and declarations; composite types; functions; pointers; types, methods, and interfaces; and error handling.

EECS482. Golang II (3 credits)
Prerequisite: EECS481
In this course, students further develop their Go programming skills. Some of the topics included are modules, packages, and imports; concurrency in Go; the Standard Library; the context; writing tests; how and when to use reflection, unsafe, and cgo; and a preview on Go’s upcoming generic support and how it fits into the language. Throughout the course, students will be introduced to design patterns experienced Go developers have adopted and explore the rationale for using them.

EECS617. Circuit Design I (3 credits)
In this course, students gain proficiency analyzing and designing simple through complex DC and AC circuits including a variety of common electronic components.

EECS618. Circuit Design II (3 credits)
Prerequisite: EECS617
In Circuit Design II, students continue to gain proficiency analyzing and designing more complex DC and AC circuits integrating a variety of commonly used electronic components.

**EECS625. Digital Design and Computer Architecture I (3 credits)**
In this 2-course series, students master digital design as they design their own microprocessor. Beginning with digital logic gates, students progress to the design of combinational and sequential circuits. Using these building blocks, students design their own microprocessor while, at the same time, gaining a firm understanding of computer architecture.

**EECS626. Digital Design and Computer Architecture II (3 credits)**
*Prerequisite: EECS625*
In this final course in a 2-part series, students continue build upon the foundational knowledge gained in Digital Design and Computer Architecture II. In this course, students learn more advanced concepts as they continue to design their own microprocessor while gaining a firm understanding of computer architecture.

**EECS631. IoT I (3 credits)**
In this course, students consider the details of the technology behind the devices used in the Internet of Things (IoT). Students analyze a mixture of theory and examples. In this course, students are provided with an overview of IoT, the parameters for designing an embedded system, good practices concerning code, version control, and defect-tracking needed to build and maintain a connected embedded system.

**EECS632. IoT II (3 credits)**
*Prerequisite: EECS631*
In IoT II, students continue to analyze the technology behind the devices used in the Internet of Things. In this course, students take an in-depth look at IoT domains including wired and wireless networking; digital filters; security in embedded and networked systems; and statistical process control for industry.

**EECS647. Logic Design with Verilog I (3 credits)**
In this 2-course series, students become knowledgeable on the underlying hardware and theories of digital design. Upon this firm understanding, students master the practical skills required to design custom digital systems using Verilog.

**EECS648. Logic Design with Verilog II (3 credits)**
*Prerequisite: EECS647*
In this course, students build upon the foundation learned in Logic Design with Verilog I as they learn advanced concepts for custom computer system design using Verilog.

**EECS651. Pre-Dissertation Applied Research (3 credits, P/D/F)**
*Offered in the Fall*
Advanced problems in any area of experimental or theoretical electrical engineering and computer science, with assigned reading and consultation. Can be repeated for credit.

EECS652. Pre-Dissertation Applied Research (3 credits, P/D/F)

Offered in the Spring

Advanced problems in any area of experimental or theoretical electrical engineering and computer science, with assigned reading and consultation. Can be repeated for credit.

EECS665. Artificial Intelligence I (3 credits)

In Artificial Intelligence I, students explore theory and useful techniques that have emerged from AI. Students are provided with key AI methods and algorithms for solving challenging problems involving systems that behave intelligently in specialized domains. Topics covered in this course include a review of the history and significance of artificial intelligence; logic- and probability-based intelligence methods; and more.

EECS666. Artificial Intelligence II (3 credits)

Prerequisite: EECS665

In this course, students continue to build upon concepts learned in Artificial Intelligence I. Students are provided with key AI methods and algorithms for solving challenging problems involving systems that behave intelligently in specialized domains. Topics covered in this course include emergent intelligence, including evolutionary computation and methods based on swarm intelligence; neural networks and deep learning; natural language understanding; and more.

EECS673. Big Data Analytics for Cloud, IoT, and Cognitive Learning I (3 credits)

In this two-course series, students are provided cutting-edge information on emerging intelligent and cognitive computing systems and technologies. They learn how to develop effective big-data computing operations on smart clouds fully supported by IoT sensing, machine learning, and analytics systems. Topics covered in this course include data science, the roles of clouds and IoT devices and frameworks for big-data computing; big data analytics and cognitive machine learning, as well as cloud architecture, IoT and cognitive systems; mobile cloud-IoT-interaction frameworks; and more.

EECS674. Big Data Analytics for Cloud, IoT, and Cognitive Learning II (3 credits)

Prerequisite: EECS673

In this final course of this series, students continue to become conversant with cutting-edge information on emerging intelligent and cognitive computing systems and technologies. Students analyze original research and best practices in the field and consider a practical approach integrating big-data theories, cloud design principles, Internet of Things (IoT) sensing, machine learning, data analytics, and Hadoop and Spark programming. Topics covered include machine learning principles and algorithms; data analytics and deep learning in big data applications; cloud programming software libraries; as well as business, educational, healthcare and social media applications for these tools.
EECS677. Machine Learning I (3 credits)
In Machine Learning I, students cover both the theory and practice of machine learning approaches used in predictive data analytics. Machine learning is often used to build predictive models by extracting patterns from large data sets. These models are used in predictive data analytics applications including price prediction, risk assessment, prediction of customer behavior, and document classification. In this course, students investigate machine learning and data analytics; data exploration; information-, similarity-, probability-, and error-based learning; and more.

EECS678. Machine Learning II (3 credits)
Prerequisite: EECS677
In this course, students build upon the foundational knowledge acquired in Machine Learning I as they continue to become cognizant of the most important machine learning approaches used in predictive data analytics, covering both theoretical concepts and practical applications. A major focus of this course is upon recent developments in machine learning, including deep learning, unsupervised and reinforcement learning.

EECS681. MATLAB I (3 credits)
In this course, students become skilled using MATLAB, a high-performance programming platform designed specifically for scientists to analyze and design systems and products that transform our world. MATLAB allows students to take their ideas from research to production. MATLAB helps students become proficient in quantitative thinking, a critical skill for every graduate student. In addition, MATLAB helps students access, visualize, and analyze data, and develop the skills required to accomplish these tasks. Millions of scientists worldwide use MATLAB for a range of applications in industry and academia, including deep learning and machine learning; single processing and communications; image and video processing; control systems; and test and measurement. In this course, students learn now to program efficiently using the extensive capabilities of MATLAB to solve technical problems. Students are instructed on programming best practice procedures.

EECS682. MATLAB II (3 credits)
Prerequisite: EECS681
In MATLAB II, students continue to refine their skills programming in MATLAB. Students can use MATLAB in their applied research projects to analyze data, develop algorithms, and create models and applications. MATLAB allows students to take their ideas from research to production by deploying to enterprise applications and embedded devices. MATLAB helps students become proficient in quantitative thinking, a critical skill for every graduate student. In this course, students learn more advanced MATLAB topics for problem-solving, including data transfer; object-oriented programming; image and sound processing; and more.
English Courses

ENGL101. English Composition (3 credits)
In English Composition, students develop their writing and rhetorical argument abilities by reading, analyzing, and writing evidence-based analytic and argumentative texts. Among the many topics covered in this course include rhetorical analysis of nonfiction texts; claims and evidence; reasoning and organization; and style. Students learn to evaluate, synthesize, and cite research supporting their arguments.

ENGL102. English Literature (3 credits)
English Literature teaches students how to analyze the literature they read. Students engage in close reading and critical analysis of imaginative texts, deepening their understanding of ways authors use language to convey their message. They learn about concepts including setting, character, perspective, structure, and figurative language. In addition, students practice their writing skills as they write expository, analytical, and argumentative essays on their own personal analysis and interpretation of literary works.

ENGL207. Technical Writing I (3 credits)
In this course, students explore how the computer is used in the technical workplace and how it can be effectively used throughout the communication process. The networked computer has become the central hub of written, spoken, and visual communication in today’s technical workplace. Computers have a powerful influence on how we develop, produce, design, and deliver technical documents and presentations. In this course, students explore various types of technical communication in the entrepreneurial workplace. They begin by considering the elements of technical communication – the importance of identifying the target audience, how to work as part of a team, and best practices for managing ethical challenges. Students continue by learning how to write various genre of technical communication. In this course, students will learn to write professional resumes, emails, letters, memos, technical specifications, and instructions.

ENGL208. Technical Writing II (3 credits)
*Prerequisite: ENGL207*
Studies show that those who know how to write clearly, speak persuasively, and design functional and attractive texts are most likely to succeed in today’s innovation-based and entrepreneurial workplace. In Technical Writing II, students continue to develop their technical communication skills. In this course, students learn to draft and write persuasive proposals, and write both brief and formal reports. Students learn how to plan and conduct meaningful research, how to design engaging documents and interfaces, and how to use graphs, charts, tables, photos, and drawing to more effectively communicate a message. In addition, students learn how to present and pitch their ideas to make the greatest impact on their audience.
Inventioneering Courses

**INVN190. Technical Entrepreneurship I (4 credits)**
Technical Entrepreneurship I prepares students with the practical training needed to learn how to use science to change the world. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or participate in projects which expose them to external organizations with real business needs and constraints, giving students an opportunity to learn in a variety of environments which they may encounter throughout their careers. The focus of the online coursework for Technical Entrepreneurship I will be upon finding new technological ideas and then evaluating their potential.

**INVN191. Technical Entrepreneurship II (4 credits)**
Prerequisite: INVN190
In Technical Entrepreneurship II, students will continue to embrace the practical training needed to learn how to use science to change the world. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or participate in projects which expose them to external organizations with real business needs and constraints, giving students an opportunity to learn in a variety of environments which they may encounter throughout their careers. The focus of the online coursework for Technical Entrepreneurship II will be upon taking a marketable idea, protecting it, pitching it, submitting it to potential licensees, and then bringing it to market.

**INVN290. Innovation I (4 credits)**
In Innovation I, students develop and hone their skills and abilities to put science to work. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or develop real-world experience through project-based learning. The focus of the online coursework for Innovation I will be upon helping students discover their innovative strengths, develop them, and then use these abilities to better understand the problem they want to solve.

**INVN291. Innovation II (4 credits)**
Prerequisite: INVN290
In this course, students further develop and hone their skills and abilities to put science to work. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or develop real-world experience through project-based learning. The focus of the online
coursework for Innovation II will build upon the previous course, helping students to create value from their ideas. In this course, students will learn how to create business models centered around their idea and persuade others to back it. They will learn how to create value from their idea and then optimize it while learning from their successes and their failures.

**INVN390. Creativity in Research I (4 credits)**
The focus of this course is to help students spark creativity and implement creative research skills as they learn how to use science to improve the world. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or develop their individual creativity through rich project experiences. The focus of the online coursework for Creativity in Research I is to help students develop key research skills through a combination of scientific literature, experiential exercises, and guided reflection.

**INVN391. Creativity in Research II (4 credits)**
*Prerequisite: INVN390*
In Creativity in Research II, students will continue to develop their creative research abilities as they learn how to use science to improve the world. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or develop their individual creativity through rich project experiences. The focus of the online coursework for Creativity in Research II is to help students cultivate conditions conducive to creativity and explore ways to meaningfully integrate and express creativity in the workplace.

**INVN490. Disruption Technology I (4 credits)**
In this course, students explore ways to use science to change the world. As part of this course, students will attend science lectures in which they will learn about practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or actively engage in project-based learning to maximize their learning experience. The focus of the online coursework for Disruption Technology I will be on learning strategies for building flexibility into an organization to enable it to adapt to a rapidly changing environment. Today, more and more industries and firms are confronted by disruptive change. The pandemic has escalated this crisis, resulting in the collapsing structures of industries ranging from airlines and medicine to online retail and commercial real estate. Students examines why successful firms find it so difficult to adapt and to innovate in the face of change.

**INVN491. Disruption Technology II (4 credits)**
*Prerequisite: INVN490*
In Disruptive Technology II, students continue to explore ways to use science to change the world. As part of this course, students will attend science lectures in which they will learn about
practical science innovations while gaining real-world insights into skills, aptitudes, and attitudes required. In combination with these lectures, students may either complete online coursework or actively engage in project-based learning to maximize their learning experience. The focus of the online coursework for Disruption Technology II will be on learning best practices used by leaders of major companies to align their organization’s cultures to fit the needed strategy and how ideation, incubation, and scaling approaches, when used altogether, can successfully develop new growth businesses.

**INVN611. Entrepreneurship I (3 credits)**
In this course, students learn about entrepreneurship as they contemplate the process of starting a business. Topics covered include developing an entrepreneurial mindset; opportunity recognition and market analysis; competition; delivering value to customers; and more.

**INVN612. Entrepreneurship II (3 credits)**
*Prerequisite: INVN611*
In Entrepreneurship II, students continue to learn about entrepreneurship and the process of starting a business. Topics covered include the business model; finance and expense management; operating a business; growing a business; and more.

**INVN615. Innovation and Entrepreneurship I (3 credits)**
In Innovation and Entrepreneurship I, students consider key theories and research on innovation and entrepreneurship and apply them to much broader contemporary context, including the corporate and public services, emerging technologies and economies, and sustainability and development, and creating and capturing value from innovation and entrepreneurship. Topics covered in this course include social innovation; innovation globalization, and development; sustainability-led innovation; entrepreneurial creativity; sources of innovation; and more.

**INVN616. Innovation and Entrepreneurship II (3 credits)**
*Prerequisite: INVN615*
In this course, students build upon their understanding of innovation and entrepreneurship and how to apply them in contemporary context. Topics covered in this course include forecasting innovation; exploiting innovation networks; developing new products and services, creating new ventures; developing businesses and talent; growing the enterprise; learning to manage innovation; and more.

**INVN627. Organizational Behavior I (3 credits)**
In this course, students are introduced to the field of organizational behavior as they explore conceptual tools to work more effectively in the workplace. Students reflect upon emerging knowledge of organizational behavior with a global focus, considering real-world examples and evidence-based literature. Students learn how work-life integration is becoming an essential employee practice in the workplace. They consider how emotions influence employee motivation, attitudes and decisions, and how self-concept is a significant factor affecting
individual behavior, team interconnectedness, and leadership. Students learn the importance of adopting a global mindset in this increasingly interconnected world.

INVN628. Organizational Behavior II (3 credits)
Prerequisite: INVN627
In Organizational Behavior II, students continue to explore the field of organizational behavior. Topics covered in this course include team dynamics; effective communication in teams and organizations; influence in the workplace; conflict and negotiation; leadership in an organization; designing organizational structures; organizational change; and more.

INVN633. Management I (3 credits)
In this course, students learn to integrate classical management principles overlayed with today’s latest management ideas. Students explore management and entrepreneurial issues within small to mid-sized companies while reflecting upon the challenges faced by larger global enterprises. Students gain valuable insights as they examine current management best practices.

INVN634. Management II (3 credits)
Prerequisite: INVN633
In Management II, students build up their understanding of management principles and best practices. In this course, students examine how change demands innovation and how innovation requires forward-thinking and flexible organizations and leadership. They explore leadership; employee motivation; managing quality and performance; and more. Students learn to be successful managers who lead change and seize business opportunities.

INVN637. Key Management Models I (3 credits)
In this course, students explore top classic, essential, and cutting-edge management models. Topics covered in this course include corporate and business strategy; organization and governance; finance; and marketing and sales.

INVN638. Key Management Models II (3 credits)
Prerequisite: INVN637
In Key Management Models II, students continue to explore essential management models. Topics covered in this course include operations, supply chain management, and procurement; innovation, technology management, and e-business; human resource and change management; and leadership.

INVN645. Leadership I (3 credits)
In this course, students are introduced to concepts of leadership by design, a theory that involved planning each step of leadership development, focusing on practical skills and valuable attributes that will maximize leadership success now and in the future. Students begin their leadership journey by considering their own personal strengths, styles, and skills. Other topics
considered in this course include designing leadership capacity; design thinking; decision-making; influence and motivation; and more.

**INVN646. Leadership II (3 credits)**

*Prerequisite: INVN645*

In Leadership II, students continue to plan steps of their leadership development as they focus on practical skills and valuable attributes that will maximize their leadership success now and in the future. Topics covered in this course include creativity, problem-solving, and idea-generation; effective practices for leading others to success; effectively using change processes; leading a team; creating a culture of innovation; entrepreneurial leadership; and more.

**INVN651. Inventioneering (3 credits, P/D/F)**

*Offered in the Fall*

Students gain practical experience in any area of applied science and the science of putting science to work, with assigned reading and consultation. Can be repeated for credit.

**INVN652. Inventioneering (3 credits, P/D/F)**

*Offered in the Spring*

Students gain practical experience in any area of applied science and the science of putting science to work, with assigned reading and consultation. Can be repeated for credit.

**INVN663. Intellectual Property I (3 credits)**

In this course, students learn about the current trends in intellectual property protection. Students begin by being introduced to intellectual properties. A major focus of this course is upon trademarks and copyrights. Cutting-edge issues such as technological innovations, intellectual property in the digital age, the role of the Internet, and evolving business law are considered.

**INVN664. Intellectual Property II (3 credits)**

*Prerequisite: INVN663*

In this course, students continue to learn about current trends in intellectual property protection as they continue to explore copyrights and then consider patents and trade secrets. Cutting-edge issues such as technological innovations, intellectual property in the digital age, the role of the Internet, and evolving business law are examined.

**INVN667. Entrepreneurial Finance I (3 credits)**

In this course, students reflect upon the modern entrepreneurial landscape and learn how to set up and manage financial aspects of any small- to medium-sized business. Topics covered in this course include writing a growth business plan; compiling and understanding financial statements; making a company profitable; valuing a company; cash flow management; and more.
INVN668. Entrepreneurial Finance II (3 credits)

*Prerequisite: INVN667*
In Entrepreneurial Finance II, students continue to explore the modern entrepreneurial landscape as they learn how to set up and manage financial aspects of any small- to medium-sized business. Topics covered in this course include entrepreneurship and intrapreneurship models; raising venture capital in private markets; crowd funding vs. crowdsourcing; taking a job with an entrepreneurial firm; and more. Students are guided through the process of maintaining steady profitability and business longevity.

INVN671. Marketing for Entrepreneurs I (3 credits)

In this course, students are provided with practical insights, strategies, and best practices for applying marketing concepts to increase the chance of new venture success. Students learn how they can use marketing to find the right opportunity and develop valuable new products and services. Students are walked through each phase of the marketing process.

INVN672. Marketing for Entrepreneurs II (3 credits)

*Prerequisite: INVN671*
In Marketing for Entrepreneurs II, students continue to learn the tools needed to launch and sustain a successful venture. Topics covered in this course include building a memorable brand; entrepreneurial channel development and promotion; social media marketing; and more.

INVN675. Search Engine Optimization I (3 credits)

Search engine optimization is often underutilized and overlooked across the marketing realm. SEO, however, not only improves website ranking on Google, but can also spark and optimize ideas. It can also improve the amount of organic traffic visiting a website. In this course, students learn a comprehensive approach to deliver the best return on investment possible for a brand and business. Topics covered in this course include an introduction to SEO; website considerations; optimization of organic traffic; stakeholders for modern SEO and organic content; and more.

INVN676. Search Engine Optimization II (3 credits)

*Prerequisite: INVN675*
In this course, students continue to explore effective strategies to improve SEO. Topics covered in this course include a discussion of the best content for driving traffic; SEO and content marketing for small businesses; creating an optimization path; and more.

INVN687. Google Ads I (3 credits)

Students learn best practices for building aggressive, streamlined Google AdWords campaigns proven to increase search engine visibility, consistently capture clicks, increase website traffic, and improve sales. Topics covered include building a campaign; conversion tracking; bidding strategies; keywords; landing pages; mastering search campaigns; and more.

INVN688. Google Ads II (3 credits)
Prerequisite: INVN687
In Google Ads II, students continue to learn best practices for building aggressive, streamlined Google AdWords campaigns. Topics covered in this course include Google shopping campaigns; YouTube advertising; Gmail campaigns; niche domination; optimization; Google analytics; and more.

Mathematics Courses

MATH101. Technical Math (3 credits)
In this course, students will learn essential math skills necessary for future success in life. Students review basic math functions, the metric system, formulas, introductory algebra, applied geometry, and basic statistics with real-world, practical applications integrated throughout.

MATH103. Business Math (3 credits)
In this course, students will be provided with a foundation in mathematical operations as they apply to business. Students will learn the concept of profit. Topics covered include percentages, discounts, markups, interest, installment buying, depreciation, investments, inventory, taxes, insurance. Students learn basic accounting practices and principles and the importance of statistics.

MATH105. College Algebra (3 credits)
In College Algebra, students develop competence working with functions and applying their properties to solve relevant, real-life examples. Students explore several families of functions including linear, polynomial, piece-wise defined, quadratic, exponential, logarithmic, rational, and radical functions. Students review systems of equalities and inequalities. They gain proficiency performing operations on the various functions, including graphing, factoring, and solving.

MATH106. Analytical Geometry & Trigonometry (3 credits)
In this course, students learn the skills needed to apply geometry and trigonometry to solve real-world problems. Among the many concepts covered include practical geometry; plane trigonometry; polygons and solids; angles; vectors; polar coordinates; complex numbers; applying, graphing and transforming trigonometric functions and their inverses; solving trigonometric equations; and use of various trigonometric laws, formulas, and identities.

MATH108. Statistics (3 credits)
In this introductory college-level statistics course, students are introduced to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students cultivate their understanding of statistics using technology, investigations, problem solving, and writing as they explore concepts like variation and distribution; patterns and uncertainty; and data-based predictions, decisions, and conclusions.
MATH110. Introduction to Calculus (3 credits)
In Introduction to Calculus, students acquire the knowledge and skills needed in preparation for calculus and other related courses required in many undergraduate majors. Specific topics include linear, quadratic, power, polynomial, exponential, logarithmic, rational, and trigonometric functions, their properties, equations, and solutions; transformation of functions; mathematical modeling; sequences; analytic trigonometry; systems of equations and equalities; vectors and matrices; conic sections; polar coordinates and graphs of polar equations; complex numbers in polar form; and to use appropriate technology to model and solve real-life problems. Students are also introduced to limits, differentiation, and integration.

MATH111. Calculus I (3 credits)
In Calculus I, students are introduced to calculus. Students cultivate their understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions.

MATH112. Calculus II (3 credits)
Prerequisite: MATH111
Calculus II extends the calculus principles learned in Calculus I. Students cultivate their understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions. In this course, students apply the content and skills learned in the previous course to parametrically defined curves, polar curves, and vector-valued function, develop additional integration techniques and applications, and are introduced to sequences and series.

MATH322. Fundamentals of Differential Equations I (3 credits)
Prerequisite: MATH112
In Fundamentals of Differential Equations I, students are introduced to the basic theory and application of ordinary differential equations as they consider a variety of modern applications in science and engineering. Topics covered in this course include linear first-order differential equations; linear second-order homogeneous differential equations with constant coefficients; the method of undetermined coefficients for nonhomogeneous equations; the method of variation of parameters for non-homogeneous second-order equations; and systems and phase plane analyses.

MATH323. Fundamentals of Differential Equations II (3 credits)
Prerequisite: MATH322
In this course, students learn more advanced applications for differential equations as they consider higher-order linear differential equations; Laplace transforms; series solutions of
differential equations; matrix methods for linear systems; complex eigenvalues; nonhomogeneous linear systems; and partial differential equations.

Physics Courses

**PHYS151. Introduction to Physics (3 credits)**
In this algebra-based physics course students explore why things in nature behave as they do. Some of the main areas of study include motion, energy, electricity, magnetism, light, sound, and optics.

**PHYS171. Fundamentals of Physics (3 credits)**
Fundamentals of Physics is an algebra-based physics course focused on helping students understand how the universe behaves. Among the many topics covered in this course include kinematics; dynamics; circular motion and gravitation; energy; momentum; electric charge and force; and waves.

**PHYS201. General Physics I (3 credits)**
*Prerequisite: MATH111*
In this calculus-based physics course, students gain a proficiency in physics and a strong understanding of the laws of nature and how to apply them. Among the several topics covered in this course include the following: linear, two-, and three-dimensional motion; Newton’s Laws of Motion; force; work; energy; momentum; impulse; collisions; rotational motion; equilibrium; and elasticity.

**PHYS202. General Physics II (3 credits)**
*Prerequisites: MATH112, PHYS201*
In this calculus-based physics course, students continue their study of the physical laws of the world we live in and how to apply this understanding to perform calculations. Some of the topics covered in this course include the following: fluid mechanics; gravitation; periodic motion; mechanical waves; sound; temperature and heat; thermal properties of matter; and thermodynamics.

**PHYS203. General Physics III (3 credits)**
*Prerequisite: PHYS202*
In this calculus-based physics course, students focus on electricity and magnetism, including using Maxwell’s equations to find electric and magnetic fields in symmetric arrangements of static charges and steady currents. They are able to solve problems and answer conceptual questions involving electromagnetic energy (potential), forces, and the motion of charged particles and dipoles, as well as analyze simple DC and AC circuits of resistors, inductors, capacitors and power supplies. They also learn how to solve problems and answer conceptual questions with changing electric and magnetic fields, including induction and electromagnetic radiation.
**PHYS204. General Physics IV (3 credits)**
*Prerequisite: PHYS203*
In this calculus-based physics course, students focus on light and optics and learn the concepts and theories behind modern physics. They are able to solve problems and answer conceptual questions involving the following: the nature and propagation of light; geometric optics; interference; diffraction; relativity; quantum mechanics; nuclear physics; and particle physics and cosmology.

**PHYS398. Engineering and Thermodynamics I (3 credits)**
*Prerequisite: PHYS202*
In Engineering and Thermodynamics I, students develop effective problem-solving strategies as they learn to apply thermodynamic principles to real-world applications. Students explore topics related to energy, the environment, biomedical/bioengineering, and other emerging technologies. A major focus of this course is upon thermodynamic concepts and definitions; energy and the First Law of Thermodynamics; properties of substances; and control volume analyses using energy.

**PHYS399. Engineering and Thermodynamics II (3 credits)**
*Prerequisite: PHYS398*
In this course, students continue to build their understanding of thermodynamics while further developing their problem-solving abilities. Among the many topics covered in this course will include the Second Law of Thermodynamics; understanding and using entropy; implementing exergy analyses; and performing calculations involving vapor power systems.

**PHYS400. Engineering and Thermodynamics III (3 credits)**
*Prerequisite: PHYS399*
In Engineering and Thermodynamics III, students delve even deeper into thermodynamics. The primary focus of this course is upon gas power systems; refrigeration and heat pump systems; and thermodynamic relationships.

**PHYS401. Engineering and Thermodynamics IV (3 credits)**
*Prerequisite: PHYS400*
In this course, students continue to expand their thermodynamic problem-solving abilities. Among the many topics covered in this course include ideal gas mixtures and psychrometric applications; reacting mixtures and combustion; and reaction equilibria.

**PHYS613. Advanced Classical Mechanics I (3 credits)**
Advanced Classical Mechanics I covers classical mechanics concepts on a deeper level, preparing students with advanced insights into this important topic and its applicability to real-world systems. Students use their strong conceptual understanding of physics to solve complex problems centered around Newton's laws of motion; projectiles and charged particles;
momentum and angular momentum; energy; oscillations; Lagrangian mechanics; two-body problems; and more.

**PHYS614. Advanced Classical Mechanics II (3 credits)**
*Prerequisite: PHYS613*
In Advanced Classical Mechanics II, students continue to deepen their understanding and strengthen their problem-solving abilities in this important area of physics. Among the many advanced topics covered in this course include non-inertial frames; rigid bodies; coupled oscillators and normal modes; chaos theory; Hamiltonian mechanics, and continuum mechanics.

**PHYS623. Electrodynamics I (3 credits)**
In this course, students explore electromagnetic theory and are provided the solid conceptual and mathematical foundation needed for exploration in related applications, including AC circuits, antenna, transmission lines, plasmas, optics, and more. Topics covered in this course include electrostatics; potentials; Laplace’s equations; electric field in matter; magnetostatics; magnetic fields in matter; and more.

**PHYS624. Electrodynamics II (3 credits)**
*Prerequisite: PHYS623*
In Electrodynamics II, students continue to investigate electromagnetic theory as they are provided with the strong academic and mathematical foundation needed for exploration of related applications such as AC circuits, antenna, transmission lines, plasmas, optics, and more. Some of the many topics covered in this course include electrodynamics; conservation laws; electromagnetic waves; potentials and fields; radiation; and electrodynamics and relativity.

**PHYS641. Modern Classical Physics I (3 credits)**
Modern Classical Physics I is designed to broaden the training of graduate physicist, preparing them for research in the field. This course covers the concepts and twenty-first century application in three of the six major areas of classical physics that every graduate physicist should be exposed to, namely statistical physics; optics (waves of various types); and elastodynamics. Students focus on modern, real-world applications as they explore the interconnections between diverse fields. Students analyze various applications taken from experimental and applied physics; astrophysics and cosmology; geophysics, oceanography, and meteorology; biophysics and chemical physics; engineering and optical science and technology; and information science and technology. In this course, the quantum roots of classical physics are emphasized as well as the use of quantum techniques to elucidate classical concepts or simplify classical calculations.

**PHYS642. Modern Classical Physics II (3 credits)**
*Prerequisite: PHYS641*
Modern Classical Physics II builds upon concepts acquired in Modern Classical Physics I. This course series is designed to broaden the training of graduate physicist, preparing them for
research in the field. This course covers the concepts and twenty-first century application in
three of the six major areas of classical physics that every graduate physicist should be
exposed to, namely fluid mechanics; plasma physics; and special and general relativity and
cosmology. Students focus on modern, real-world applications as they explore the
interconnections between diverse fields. Students analyze various applications taken from
experimental and applied physics; astrophysics and cosmology; geophysics, oceanography,
and meteorology; biophysics and chemical physics; engineering and optical science and
technology; and information science and technology. The quantum roots of classical physics are
emphasized as well as the use of quantum techniques to elucidate classical concepts or simplify
classical calculations.

PHYS651. Pre-Dissertation Applied Research  (3 credits, P/D/F)
Offered in the Fall
Advanced problems in any area of experimental or theoretical physics, with assigned reading
and consultation. Can be repeated for credit.

PHYS652. Pre-Dissertation Applied Research  (3 credits, P/D/F)
Offered in the Spring
Advanced problems in any area of experimental or theoretical physics, with assigned reading
and consultation. Can be repeated for credit.

PHYS661. Astronomy I (3 credits)
In Astronomy I, students acquire a broad understanding of the universe. With an emphasis on
the process of scientific discovery, students gain an understanding of why we know what we do
and are cognizant of current research being conducted in the field today. Students reflect upon
recent discoveries in the field of astronomy. A major focus of this course is astronomy and the
universe and our planetary system.

PHYS662. Astronomy II (3 credits)
Prerequisite: PHYS661
In Astronomy II, students continue to broaden their understanding of the universe. With an emphasis on
the process of scientific discovery, students gain an understanding of why we know what we do
and are cognizant of current research being conducted in the field today. Students reflect upon
recent discoveries in the field of astronomy. A major focus of this course is upon stars, stellar evolution, galaxies, and cosmology.

PHYS677. Gravitation I (3 credits)
In this rigorous, two-part course, students will explore Einstein’s general theory of relativity and
the physics of gravitation. This course provides essential understanding for students and
researchers interested in the field of relativity. In this course, students investigate spacetime
physics; learn how to grasp the laws of physics in flat and curved spacetime; and explore
PHYS678. Gravitation II (3 credits)
Prerequisite: PHYS677
In this final course of a rigorous two-part series, students will explore Einstein’s general theory of relativity and the physics of gravitation. This course provides essential understanding for students and researchers interested in the field of relativity. In this comprehensive course, students continue to learn about the theory of relativity; analyze physical applications, from stars to black holes and gravitational waves; and explore the fields frontiers. In this course, students explore applications, including neutron stars, Schwarzschild and Kerr black holes; gravitational collapse, gravitational waves; cosmology, and much more.

PHYS681. MATLAB I (3 credits)
In this course, students become skilled using MATLAB, a high-performance programming platform designed specifically for scientists to analyze and design systems and products that transform our world. MATLAB allows students to take their ideas from research to production. MATLAB helps students become proficient in quantitative thinking, a critical skill for every graduate student. In addition, MATLAB helps students access, visualize, and analyze data, and develop the skills required to accomplish these tasks. MATLAB brings together a knowledge of physics, engineering, and computational skills – critically important components required for many applied research projects. In this course, students learn how to program efficiently using the extensive capabilities of MATLAB to solve technical problems. Students are instructed on programming best practice procedures.

PHYS682. MATLAB II (3 credits)
Prerequisite: PHYS681
In MATLAB II, students continue to refine their skills programming in MATLAB. Students can use MATLAB in their applied research projects to analyze data, develop algorithms, and create models and applications. MATLAB allows students to take their ideas from research to production by deploying to enterprise applications and embedded devices. MATLAB helps students become proficient in quantitative thinking, a critical skill for every graduate student. MATLAB combines a knowledge of physics and engineering together with computational skills, two important components required for many applied research projects. In this course, students learn more advanced MATLAB topics for problem-solving, including data transfer; object-oriented programming; image and sound processing; and more.

Final Project Courses

PROJ498. Senior Project I (5 credits)
Prerequisite: All coursework must be completed before taking this class
In this two-term culminating project, students integrate and synthesize competencies and skills from across all program domains into one final project, thereby demonstrating the ability to participate in and contribute value to their field of study.
PROJ499. Senior Project II (5 credits)
*Prerequisite: PROJ498*
In this two-term project, students integrate and synthesize competencies and skills from across all program domains into one final project, thereby demonstrating the ability to participate in and contribute value to their field of study. At the conclusion of the course, students will submit a formal report on the completed project.

PROJ598. Graduate Capstone Project I (3 credits)
*Prerequisite: All coursework must be completed before taking this class*
In Graduate Capstone Project I, students demonstrate their professional theoretical and practical abilities by addressing a real-world challenge in their field of specialization. In this 2-part course, students are required to integrate knowledge, skills, and abilities acquired throughout their studies into a single project. In addition, as students demonstrate pursuit of a focused research question, they have an opportunity to exhibit advanced analytical and decision-making skills. The capstone project is an independent effort completed under the supervision of departmental faculty.

PROJ599. Graduate Capstone Project II (3 credits)
*Prerequisite: PROJ598*
In Graduate Capstone Project II, students continue to demonstrate their professional theoretical and practical abilities by addressing a real-world challenge in their field of specialization. In this 2-part course, students are required to integrate knowledge, skills, and abilities acquired throughout their studies into a single project. In addition, as students demonstrate pursuit of a focused research question, they have an opportunity to exhibit advanced analytical and decision-making skills. The capstone project is an independent effort completed under the supervision of departmental faculty. At the conclusion of this course, students will submit a formal report on the completed project.

Research Methodologies Courses

RESM610. Literature Review (3 credits)
In this course, students consider the literature review in the process of research design and how to develop a research practice that builds skills in reading and writing about research literature; skills value in both academic and professional careers. The literature review helps graduate researchers refine, define, and express their own vision and voice. This orientation on research as an exploratory practice allows the researcher to deal with the uncertainties and changes that come with learning new ideas and perspectives.

RESM611. Research Design (3 credits)
*Prerequisite: RESM610*
In this course, students will continue to build upon principles learned in Literature Review as they conduct a literature review on a research topic. The focus on the practical elements of research design makes this course ideal for graduate students writing dissertations. Practicing research allows room for experiment, error, and learning, ultimately helping graduate researchers use the literature effectively to build a foundation for their dissertation research project.

**RESM628. Research Methods I (3 credits)**
In this 4-part series, students are provided practical guidance on how to plan and conduct research. A major focus of this course is on the fundamental of research.

**RESM629. Research Methods II (3 credits)**
*Prerequisite: RESM628*
In this 4-part series, students are provided practical guidance on how to plan and conduct research. A major focus of this course is on principles of defining the research project.

**RESM630. Research Methods III (3 credits)**
*Prerequisite: RESM629*
In this 4-part series, students are provided practical guidance on how to plan and conduct research. A major focus of this course is on various types of research designs.

**RESM631. Research Methods IV (3 credits)**
*Prerequisite: RESM630*
In this 4-part series, students are provided practical guidance on how to plan and conduct research. A major focus of this course is on data analyses and planning and preparing a final research report.

**Dissertation Courses**

**DISS698. Directed Dissertation Research I (7 graduate credits)**
*Prerequisite: Comprehensive exam must be passed before taking this class*
Program of applied research leading to the writing of a dissertation; to be arranged by the student and an appropriate IST faculty member.

**DISS699. Directed Dissertation Research II (8 graduate credits)**
*Prerequisite: DISS698*
Program of applied research leading to the writing of a dissertation; to be arranged by the student and an appropriate IST faculty member.