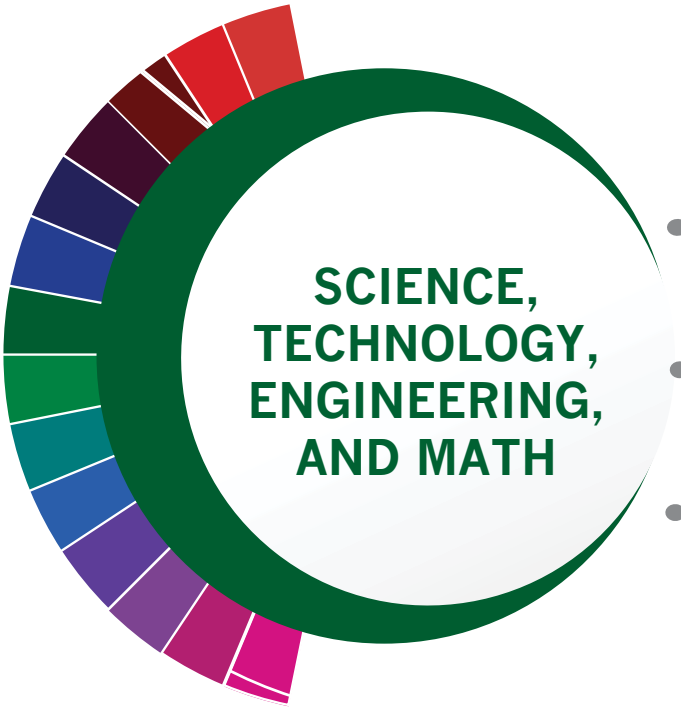


BIOMEDICAL SCIENCE

CYBERSECURITY

ENGINEERING

PROGRAMMING AND SOFTWARE DEVELOPMENT

RENEWABLE ENERGY

Local Implementation Considerations:

Students completing two or more courses for two or more credits within a program of study earn concentrator status for Perkins V federal accountability reporting.

Proposed Indicator: Students finishing three or more courses for four or more credits with one course from level 3 or 4 within a program of study earn completer status for federal accountability reporting.

TEA
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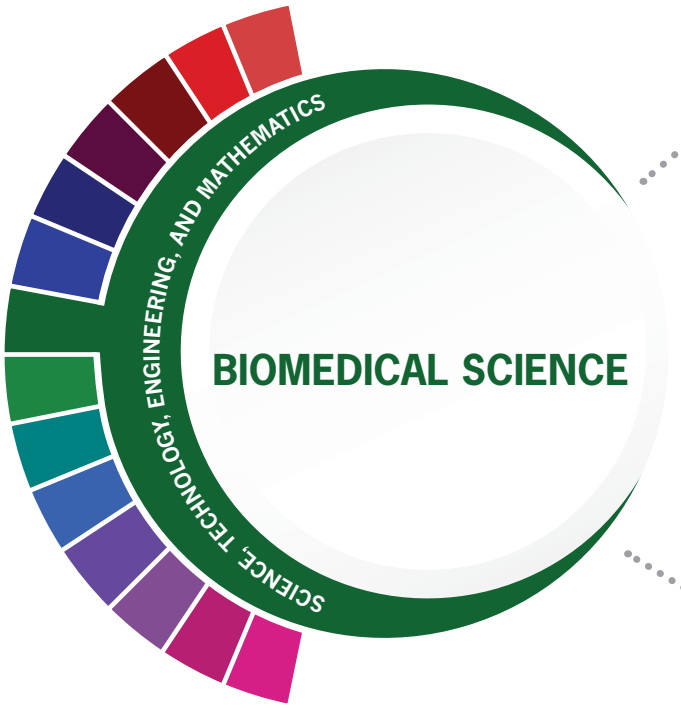


## COURSES

**LEVEL 1**

Principles of Biosciences
Principles of Biomedical Science (PLTW)

**LEVEL 2**

Human Body Systems (PLTW)
Biotechnology I

**LEVEL 3**

Biotechnology II
Medical Microbiology
Medical Interventions (PLTW)

**LEVEL 4**

Pathophysiology
Biomedical Innovations (PLTW)
Practicum in Science, Technology, Engineering, and Mathematics
Scientific Research and Design

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| Medical Laboratory Assistant | Medical and Clinical Laboratory Technologists | Histologic Technician | Molecular Biology | Genetic Counseling |
| Medical Laboratory Technician | | | Biomedical Engineers | Medical Scientist |
| | | Clinical Laboratory Science/ Medical Technology/ Technologist | Clinical Laboratory Science/ Medical Technology/ Technologist | Epidemiology |
| | | | | |

Additional industry based certification information is available from the TEA CTE website.

For more information on postsecondary options for this program of study, visit TXCTE.org.

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Medical and Laboratory Technicians | $37,981 | 1,159 | 28% |
| Biological Technicians | $42,931 | 452 | 17% |
| Forensic Science Technicians | $48,152 | 171 | 35% |
| Chemical Technicians | $49,733 | 672 | 10% |
| Medical and Clinical Laboratory Technologists | $58,760 | 1,166 | 25% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

| Exploration Activities: | Work Based Learning Activities: |
|---|---|
| Health Occupations Students of America (HOSA) | Lab internship or shadow a healthcare or medical professional |

The Biomedical Science program of study focuses on the study of biology and medicine in order to introduce students to the knowledge and skills necessary to be successful in the healthcare field, such as researching and diagnosing dieases, pre-existing conditions, or other determinants of health. Students may also practice patient care and communication.

The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing, scientific research and professional and technical services, including laboratory and testing services, and research and development services.

Successful completion of the Biomedical Science program of study will fulfill requirements of the Public Service Endorsement or STEM Endorsement, dependent upon courses chosen.

Approved Statewide Program of Study - September 2019

Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Principles of Biosciences | 13036300 (1 credit) | None | 9-10 |
| Principles of Biomedical Science (PLTW) | N1302092 (1 credit) | None | 11-12 |
| Human Body Systems (PLTW) | N1302093 (1 credit) | None | 10-12 |
| Biotechnology I | 13036400 (1 credit) | PREQ: Biology | 11-12 |
| Biotechnology II | 13036450 (1 credit) | PREQ: Biotechnology I and Chemistry and Biology | 11-12 |
| Medical Microbiology | 13020700 (1 credit) | PREQ: Biology and Chemistry | 10-12 |
| Medical Interventions (PLTW) | N1302094 (1 credit) | None | 10-12 |
| Pathophysiology | 13020800 (1 credit) | PREQ: Biology and Chemistry | 11-12 |
| Biomedical Innovation (PLTW) | N1302095 (1 credit) | None | 11-12 |
| Practicum in Science, Technology, Engineering, and Mathematics | 13037400 (2 credits)<br>13037405 (3 credits)<br>13037410 (2 credits)<br>13037415 (3 credits) | PREQ: Algebra I and Geometry | 12 |
| Scientific Research and Design | 13037200 (1 credit) | PREQ: Biology, Chemistry, Integrated Physics and Chemistry (IPC), or Physics | 11-12 |
| | | | |
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**FOR ADDITIONAL INFORMATION ON THE SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS CAREER CLUSTER, PLEASE CONTACT:**

https://tea.texas.gov/cte

## COURSES

**LEVEL 1**

Principles of Information Technology
Fundamentals of Computer Science
Foundations of Cybersecurity

**LEVEL 2**

Internetworking Technologies I
Computer Programming I
Computer Science I
AP Computer Science Principles
Computer Maintenance/Lab

**LEVEL 3**

Internetworking Technologies II
Engineering Applications of Computer Science Principles
Networking/Lab
Digital Forensics
AP Computer Science A

**LEVEL 4**

Cybersecurity Capstone
Practicum in Information Technology
Practicum in STEM
Project-Based Research

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| Oracle Certified Associate Java SE 8 | GIAC Reverse Engineering Malware | System Networking, and LAN/WAN Management | Computer Systems Networking and Telecommunications | Computer Systems Analysis/Analyst |
| Oracle Certified Database Associate | Certified Advanced Windows Forensic Examiner | Information Technology | Computer Systems Networking and Telecommunications | Information Technology |
| Cisco Certified Entry Networking Technician (CCENT) | SAP Certified Technology Professional System Security Architect | Computer and Information Sciences, General | | |
| Associate of (ISC)2 | Cisco Certified Network Professional Security Certification | Computer Science | | |

Additional industry based certification information is available from the TEA CTE Website

For more information on postsecondary options for this program of study, visit TXCTE.org.

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Information Security Analysts | $91,915 | 814 | 29% |
| Network and Computer System Administrators | $82,597 | 2,814 | 19% |
| Computer Systems Analyst | $87,568 | 5,937 | 29% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

**Exploration Activities:**

Join TSA
Job shadow a computer system analyst or information security analyst.

**Work Based Learning Activities:**

Obtain an industry based certification.

The Cybersecurity program of study includes the occupations and educational opportunities related to planning, implementing, upgrading, or monitoring security measure for the protection of computer networks and information. This program of study may also include exploration into responding to computer security breaches and virus and administering network security measures.

The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing, scientific research and professional and technical services, including laboratory and testing services, and research and development services.

Successful completion of the Cybersecurity program of study will fulfill requirements of a Business and Industry or STEM Endorsement.
Approved Statewide Program of Study - September 2019

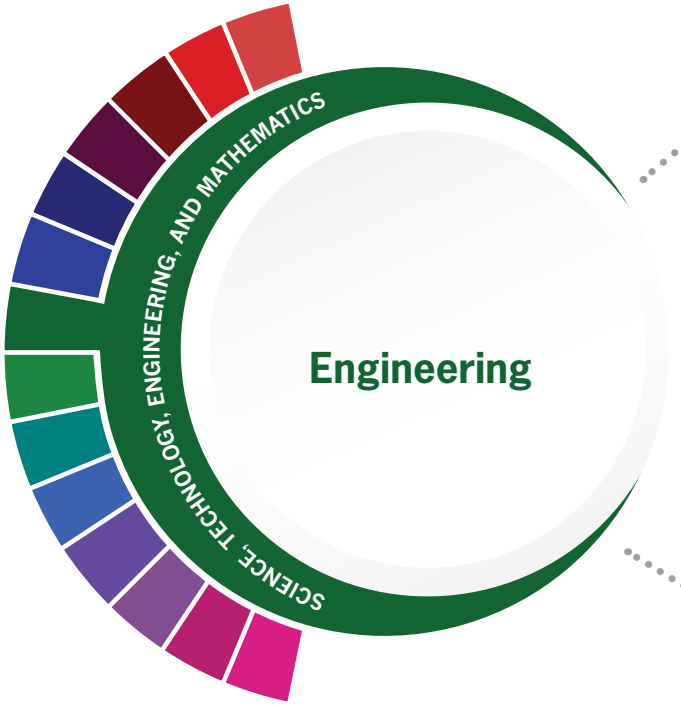
TEA Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Principles of Information Technology | 03580140 (1 credit) | None | 9-10 |
| Fundamentals of Computer Science | 13027600 (1 credit) | PREQ: Principles of Information Technology and Algebra I | 9-12 |
| Foundations of Cybersecurity | A3580300 (1 credit) | PREQ: Algebra I | 9-12 |
| Internetworking Technologies I | N1302803 (1 credit) | PREQ: Algebra I | 10-12 |
| Computer Programming I | N1302812 (1 credit) | PREQ: Computer Science II | 10-12 |
| Computer Science I | A3580100 (2 credits) | PREQ: Algebra I | 9-12 |
| AP Computer Science Principles | 03580390 (1 credit) | PREQ: Algebra I | 9-12 |
| Computer Maintenance | 13027300 (1 credit)<br>13027310 (2 credits) | None | 10-12 |
| Internetworking Technologies II | N1302804 (1 credit) | Prerequisite: Internetworking Technologies I | 11-12 |
| Engineering Applications of Computer Science Principles | 13027700 (1 credit) | PREQ: Principles of Information Technology and Computer Programming I | 10-12 |
| Networking/Lab | 03580300 (1 credit) | PREQ: Algebra I, Computer Science I, or Fundamentals of Computer Science | 10-12 |
| Digital Forensics | 03580350 (1 credit) | PREQ: Computer Science II, AP Computer Science A | 9-12 |
| AP Computer Science A | A3580110 (1 credit)<br>A3580120 (1 credit) | None | 9-12 |
| Cybersecurity Capstone | 03580855 (1credit) | None | 11-12 |
| Practicum in Information Technology | 13008700 (2 credit) 13008705 (3 credit)<br>13008710 (2 credit) 13008715 (3 credit) | PREQ: Two high school Information Technology courses | 12 |
| Practicum in STEM | 13037400 (2 credits) 13037405 (3 credits)<br>13037410 (2 credits) 13037415 (3 credits) | PREQ: Algebra I and Geometry | 12 |
| Project-Based Research | 13037400 (2 credit) 13037405 (3 credit)<br>13037410 (2 credit) 13037415 (3 credit) | PREQ: Algebra I and Geometry | 11-12 |

**FOR ADDITIONAL INFORMATION ON THE SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS CAREER CLUSTER, PLEASE CONTACT:**

https://tea.texas.gov/cte




## COURSES

**LEVEL 1**

Principles of Applied Engineering
Computer Aided Drafting for Manufacturing (TBD)
Introduction to Engineering Design (PLTW)

**LEVEL 2**

Manufacturing Engineering Technology I

**LEVEL 3**

Engineering Design and Development (PLTW)
Engineering Design and Presentation I
Computer Integrated Manufacturing (PLTW)
Aerospace Engineering (PLTW)
Digital Electronics
Civil Engineering and Architecture (PLTW)
Engineering Science
Environmental Sustainability (PLTW)

**LEVEL 4**

Engineering Design and Problem Solving
Engineering Design and Presentation II
Practicum in STEM
Scientific Research and Design

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| Autodesk Certified Professional or User (ACU) - Inventor | Engineer, Professional | Electrical and Electronics Engineering | Electrical and Electronics Engineering | Electrical and Electronics Engineering |
| Certified SolidWorks Associate (CSWA) | Fluid Power Systems Designer | Drafting and Design Technology/ Technician, General | CAD/CADD Drafting and/or Design Technology/ Technician | Mechanical Engineering |
| Certified Engineering Technician - Audio Systems | Certified Biomedical Auditor | Engineering Technology | Bioengineering and Biomedical Engineering | Bioengineering and Biomedical Engineering |
| | Certified Cost Estimator/ Analyst | | Construction Engineering Technology/ Technician | |

Additional industry based certification information is available from the TEA CTE website.

For more information on postsecondary options for this program of study, visit TXCTE.org.

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Aerospage Engineers | $110,843 | 481 | 9% |
| Industrial Engineers | $97,074 | 1,263 | 10% |
| Mechanical Engineers | $91,707 | 1,535 | 11% |
| Chemical Engineers | $112,819 | 474 | 9% |
| Electrical Engineers | $98,405 | 1,137 | 10% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

Exploration Activities:
Participate in competitions like Skills USA

Career Preparation Activities:
Engineering internship
Job shadow a machinist

The Engineering program of study focuses on the design, development, and use of engines, machines, and structures. Students will learn how to apply science, mathematical methods, and empirical evidence to the innovation, design, construction, operation, and maintenance of different manufacturing systems.

The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster® focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.

Successful completion of the Engineering program of study will fulfill requirements of the Business and Industry or STEM Endorsement.

Approved Statewide Program of Study - September 2019

Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Principles of Applied Engineering | 13036200 (1 credit) | None | 9-10 |
| Computer Aided Drafting for Manufacturing (TBD) | TBD | TBD | TBD |
| Introduction to Engineering Design (PLTW) | N1303742 (1 credit) | None | 9-12 |
| Manufacturing Engineering Technology I | 13032900 | None | 10-12 |
| Engineering Design & Development (PLTW) | N1303749 (1 credit) | None | 9-12 |
| Engineering Design & Presentation I | 13036500 (1 credit) | PREQ: Algebra I | 10-12 |
| Computer Integrated Manufacturing (PLTW) | N1303748 (1 credit) | None | 9-12 |
| Aerospace Engineering (PLTW) | N1303745 (1 credit) | None | 9-12 |
| Digital Electronics | 13037600 (1 credit) | PREQ: Algebra I and Geometry | 10-12 |
| Civil Engineering & Architecture (PLTW) | N1303747 (1 credit) | None | 9-12 |
| Engineering Science | 13037500 (1 credit) | PREQ: Algebra I and Biology Chemistry, Integrated Physics, and Chemistry (IPC), or Physics | 10-12 |
| Environmental Sustainability (PLTW) | N1303746 (1 credit) | None | 9-12 |
| Engineering Design & Problem Solving | 13037300 (1 credit) | PREQ: Algebra I and Geometry | 11-12 |
| Engineering Design and Presentation II | 13036600 (2 credits) | PREQ: Algebra I and Geometry | 11-12 |
| Practicum in Science, Technology, Engineering, and Mathematics | 13037400 (2 credits)<br>13037405 (2 credits)<br>13037410 (3 credits)<br>13037415 (3 credits) | PREQ: Algebra I and Geometry | 12 |
| Scientific Research & Design | 13037200 (1 credit) | PREQ: Biology, Chemistry, Integrated Physics, and Chemistry (IPC), or Physics | 11-12 |

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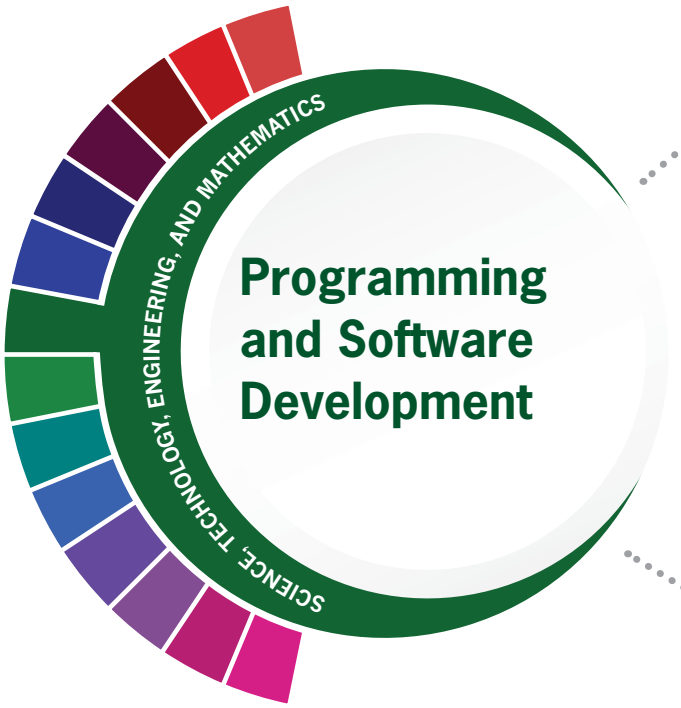


# Programming and Software Development

## COURSES

**LEVEL 1**

Fundamentals of Computer Science

**LEVEL 2**

Computer Programming I
AP Computer Science Principles
Computer Science I

**LEVEL 3**

Introduction to C# Programming
Applications
AP Computer Science A
Mobile App Development
Computer Programming II
Computer Science II

**LEVEL 4**

Computer Science III
Practicum in Information Technology
Practicum of A/V Production
Practicum in STEM
Career Preparation I

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| Oracle Certified Association JAVA SE 8 Programmer | Certified Computing Professional | Computer Programming/Programmer General | Mangement Information Systems, General | |
| Oracle Certified Database Associate | Cloud Technology Associate Certification | Computer Software Engineer | | |
| | AEM 6 Developer | Computer Science | | |
| | Certifed Software Analyst | Information Science/Studies | | |

*Includes Level I and Level II Certificates

For more information on postsecondary options for this programs of study, visit TXCTE.org

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Computer Network Architect | $111, 633 | 1,454 | 9% |
| Software Developer, Systems Software | $103, 334 | 2985 | 25% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

| Exploration Activities: | Work Based Learning Activities: |
|---|---|
| Join TSA<br>Participate in a coding club at school. | Obtain an industry based certification. |

The programming and Software Development program of study explores the occupations and education opportunities associated with researching, designing, developing, and testing operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computer applications. This program of study may also include exploration into creating, modifying, and testing the codes, forms, and script that allow computer applications to run

The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing, scientific research and professional and technical services, including laboratory and testing services, and research and development services.

Successful completion of the Programming and Software Development program of study will fulfill requirements of a Business and Industry or STEM Endorsement.

Approved Statewide Program of Study - September 2019

Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Fundamentals of Computer Science | 03580140 (1 credit) | None | 9-12 |
| Computer Programming I | 13027600 (1 credit) | PREQ: Principles of Information Technology and Algebra I | 10-12 |
| AP Computer Science Principles | A3580300 (1 credit) | PREQ: Algebra I | 9-12 |
| Computer Science I | 03580200 (1 credit) | PREQ: Algebra I | 11-12 |
| Introduction to C# Programming Applications | N1302812 (1 credit) | PREQ: Computer Science II | 11-12 |
| AP Computer Science A | A3580100 (2 credits) | PREQ: Algebra I | 9-12 |
| Mobile App Development | 03580390 (1 credit) | PREQ: Algebra I | 11-12 |
| Computer Programming II | 13027700 (1 credit) | PREQ: Principles of Information Technology and Computer Programming I | 11-12 |
| Computer Science II | 03580300 (1 credit) | PREQ: Algebra I, Computer Science I, or Fundamentals of Computer Science | 11-12 |
| Computer Science III | 03580350 (1 credit) | PREQ: Computer Science II, AP Computer Science A | 12 |
| Practicum in Information Technology | 13028000 (2 credit)<br>13028005 (3 credit)<br>13028010 (2 credit)<br>13028015 (3 credit) | PREQ: a minimum of two high school information technology courses | 11-12 |
| Practicum in A/V Production | 13008700 (2 credit)<br>13008705 (3 credit)<br>13008710 (2 credit)<br>13008715 (3 credit) | PREQ: Audio/Video Production II Lab | 11-12 |
| Practicum in STEM | 13037400 (2 credit)<br>13037405 (3 credit)<br>13037410 (2 credit)<br>13037415 (3 credit) | PREQ: Algebra I and Geometry | 11-12 |
| Career Preparation I | 12701300 (2 credit)<br>12701305 (3 credit) | None | 11-12 |

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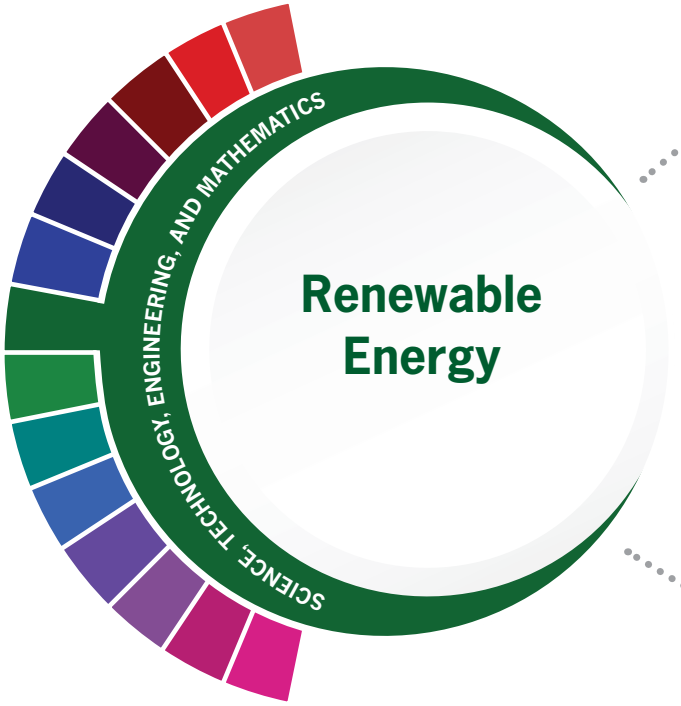


## COURSES

**LEVEL 1**

Principles of Applied Engineering
Foundations of Energy

**LEVEL 2**

AC/DC Electronics
Energy and Natural Resources Technology
Introduction to Renewable Energy (TBD)

**LEVEL 3**

Environmental Sustainability (PLTW)
Solid State Electronics
Scientific Research and Design

**LEVEL 4**

Digital Electronics
Engineering Design and Problem Solving
Project-Based Research
Applied Mathematics for Technical Professionals
Practicum in STEM
Practicum in Energy (TBD)

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| | Photovoltaic Installer-Level 1 Professional | Industrial Mechanics and Maintenance Technology | Surveying Engineering | |
| | Solar Photovoltaic Certiifciation | Solar Energy Technology/ | Systems Engineering | |
| | Small Wind Installer-Level 1 | Engineering, Mechanics | | Manufacturing Engineering |
| | | Engineering, General | | |

*Includes Level I and Level II Certificates

For more information on postsecondary options for this program of study, visit TXCTE.org

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Wind Turbine Services Technician | $51,334 | 387 | 108% |
| Solar Photovoltaic Installer | $43,957 | 470 | 81% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

| Exploration Activities: | Work Based Learning Activities: |
|---|---|
| SkillsUSA<br>Science Club | Research four renewable energy companies and compare them. |

The Renewable Energy program of study helps students discover to assemble, inspect, maintain, and repair different equipment required for renewable energy. It introduces students to solar photovoltaic equipment and wind turbines, the systems and processes used to maintain and manage these types of equipment, and helps students develop the skills needed to do so.

The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing, scientific research and professional and technical services, including laboratory and testing services, and research and development services.

Successful completion of the Renewable Energy program of study will fulfill requirements of the Business and Industry or STEM endorsement.

Statewide Approved Program of Study - September 2019

Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Principles of Applied Engineering | 13036200 (1 credit) | None | 9-12 |
| Foundations of Energy | N1300263 (1 credit) | None | 9-12 |
| AC/DC Electronics | 13036800 (1 credit) | PREQ: Principles of Applied Engineering | 10-12 |
| Energy and Natural Resources Technology | 13001100 (1 credit) | PREQ: At least 1 credit from courses in the Agriculture, Food, and Natural Resources Cluster | 10-12 |
| Introduction to Renewable Energy | TBD | TBD | TBD |
| Environmental Sustainability | N13003746 (1 credit) | None | 9-12 |
| Solid State Electronics | 13036900 (1 credit) | PREQ: AC/DC Electronics | 11-12 |
| Scientific Research and Design | 13037200 (1 credit) | PREQ: Biology, Chemistry, Integrated Physics and Chemistry (IPC), or Physics | 11-12 |
| Digital Electronics | 13037600 (1 credit) | PREQ: Algebra 1 and Geometry | 10-12 |
| Engineering Design and Problem Solving | 13037300 (1 credit) | PREQ: Algebra 1 and Geometry | 11-12 |
| Project Based Research | 12701500 (1 credit) | None | 11-12 |
| Applied Mathematics for Technical Professionals | 1270410 (1 credit) | None | 11-12 |
| Practicum in STEM | 13037400 (2 credits)<br>13037405 (2 credits)<br>13037410 (3 credits)<br>13037415 (3 credits) | PREQ: Algebra I and Geometry | 12 |
| Practicum in Energy (TBD) | TBD | TBD | TBD |

**FOR ADDITIONAL INFORMATION ON THE SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS CAREER CLUSTER, PLEASE CONTACT:**

https://tea.texas.gov/cte