



High School Course Guide



Science,
Technology,
Engineering &
Mathematics

80260 Applied Mathematics for Technical Professionals (R)

1 credit

Gr: 10-12

Prerequisite: Recommended prerequisites: Algebra I and Geometry

Description: (SGHS only) Applied Mathematics for Technical Professionals uses problem-solving situations, hands-on activities, and technology to extend mathematical thinking and engage student reasoning. Situations relating to technical applications provide students opportunities to make connections with mathematics and the workplace. In addition, students will learn the skills necessary to communicate using mathematics. Hands-on activities will allow students to model, explore, and develop abstract concepts applicable to technical careers. (Essential to this course is the partnership between mathematics and technical teachers.) **(Math Credit option)**

80250 AC/DC Electronics (R)

1 credit

Gr: 10-12

80255 AC/DC Electronics (DC) ⓓ

Prerequisite: Recommended Principles of Applied Engineering

Description: (SGHS only) AC/DC Electronics is designed to provide students with both practical and technical training in the field of electronics. Areas of study include basic principles of electricity and electronics, fundamentals of direct current, soldering practices, meters, circuits, resistance, and voltage and current, measurement, conductors, insulators, inductance, capacitance, and other topics related to electronics technology. Students completing this course are prepared to enter various phases of the electronics industry. Students enrolled in this course will demonstrate knowledge and applications of circuits, electronic measurement, and electronic implementation. Through use of the design process, students will transfer academic skills to component designs in a project-based environment. Students will use a variety of computer hardware and software applications to complete assignments and projects. Additionally, students explore career opportunities.

8B931 Electrical Technology - Project Management (R)

1 credit

Gr: 11-12



GRCTC

Prerequisite: None

Description: Basics of Student Project management is designed for students to gain insight and skills in the overall disciplines and general practices of student project management, and how to organize and plan a project, how to monitor, control and communicate the production of the project, and how to promote continuous usage of project management skills.

80370 Digital Electronics (R)

1 credit

Gr: 11-12

80375 Digital Electronics (DC) ⓓ

Prerequisite: Algebra I and Geometry

Description: (SGHS only) Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by two discrete voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world of electronics. Digital electronics is the foundation of modern electronic devices such as cellular phones, digital audio players, laptop computers, digital cameras, and high-definition televisions. The primary focus of Digital Electronics is to expose students to the design process of combinational and sequential logic design, teamwork, communication methods, engineering standards, and technical documentation. **This course satisfies a high school mathematics graduation requirement**

80270 Engineering Application of Computer Science Principles

1 credit

Gr: 10-12

Prerequisite: Algebra I

Description: This is a design-based high school course for students who want to expand and deepen their engineering design skills and habits of mind through the purposeful integration and application of computer science (CS) principles and practices. Developed by University of Texas Engineering and Computer Engineering faculty, this hands-on course engages students in authentic, integrated engineering and CS practices in a project-based environment. Building on the skills and habits of mind developed in an introductory engineering design course, EACSP scaffolds students' acquisition and application of CS principles across a series of engaging and socially relevant design challenges.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.

**80230 Engineering Design and Presentation I (R)****1 credit****Gr: 10-12****GRCTC****Prerequisite:** Algebra I

Description: Students enrolled in this course will demonstrate knowledge and skills of the process of design as it applies to engineering fields using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Students will use a variety of computer hardware and software applications to complete assignments and projects. Through implementation of the design process, students will transfer advanced academic skills to component designs. Additionally, students explore career opportunities in engineering, technology, and drafting and what is required to gain and maintain employment in these areas.

.80960 Engineering Design and Presentation II**2 credits****Gr: 11-12****GRCTC****Prerequisite:** Geometry, Algebra 2, Chemistry, and Physics, R. Prerequisite Engineering Design and Presentation I

Description: Engineering design is the creative process of solving problems by identifying needs and then devising solutions. Students use the engineering design process cycle to investigate, design, plan, create and evaluate solutions. Science aims to understand the natural world, while engineering seeks to shape this world to meet human needs and wants. Engineering design takes into consideration limiting factors or "design under constraint." The design process and problem solving are inherent to all engineering disciplines. This course reinforces and integrates skills learned in previous mathematics and science courses and emphasizes solving problems, moving from well-defined toward more open ended, with real-world application. Students apply critical-thinking skills to justify a solution from multiple design options. Additionally, the course promotes interest in and understanding of career opportunities in engineering and fosters awareness of the social and ethical implications of technological development.

80312 Engineering Design and Problem Solving (R)**1 credit****Gr: 11-12****Prerequisite:** Algebra 1 and Geometry

Description: (Only at GHS). Engineering design is the creative process of solving problems by identifying needs and then devising solutions, using the engineering design process cycle to investigate, design, plan, create and evaluate solutions. Science aims to understand the natural world, while engineering seeks to shape this world to meet human needs and wants. Engineering design takes into consideration limiting factors or "design under constraint." The design process and problem solving are inherent to all engineering disciplines. This course reinforces and integrates skills learned in previous mathematics and science courses and emphasizes solving problems, moving from well-defined toward more open ended, with real-world application. Students apply critical-thinking skills to justify a solution from multiple design options. The course promotes interest in and understanding of career opportunities in engineering and fosters awareness of the social and ethical implications of technological development.

80910 Engineering Design and Problem Solving - Robotics (R) (SPRING)**1 credit****Gr: 11-12****GRCTC****Prerequisite:** Algebra 1 and Geometry. Fall 80900 Robotics II

Description: Engineering design is the creative process of solving problems by identifying needs and then devising solutions. Students use the engineering design process cycle to investigate, design, plan, create and evaluate solutions. Science aims to understand the natural world, while engineering seeks to shape this world to meet human needs and wants. Engineering design takes into consideration limiting factors or "design under constraint." The design process and problem solving are inherent to all engineering disciplines. This course reinforces and integrates skills learned in previous mathematics and science courses and emphasizes solving problems, moving from well-defined toward more open ended, with real-world application. Students apply critical-thinking skills to justify a solution from multiple design options. Additionally, the course promotes interest in and understanding of career opportunities in engineering and fosters awareness of the social and ethical implications of technological development. Student must meet the 40% laboratory and fieldwork requirements for science credit. **(Science Credit)**

NOTE: All courses may not be offered on every campus.
 2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.

**80940 Engineering Mathematics (R)****1 credit****Gr: 10-12****Prerequisite:** Algebra II

Description: Engineering Mathematics is a course where students solve and model design problems. Students will use a variety of mathematical methods and models to represent and analyze problems that represent a range of real-world engineering applications such as robotics, data acquisition, spatial applications, electrical measurement, manufacturing processes, materials engineering, mechanical drives, pneumatics, process control systems, quality control, and computer programming. **[Math credit]**

80260 Engineering Mathematics (R)**1 credit****Gr: 10-12****Prerequisite:** Algebra II

Description: Engineering Mathematics is a course where students solve and model design problems. Students will use a variety of mathematical methods and models to represent and analyze problems that represent a range of real-world engineering applications such as robotics, data acquisition, spatial applications, electrical measurement, manufacturing processes, materials engineering, mechanical drives, pneumatics, process control systems, quality control, and computer programming. **[Math credit option]**

80930 Engineering Science (R)**1 credit****Gr: 10-12****Prerequisite:** Algebra I and Biology, Chemistry, IPC or Physics. R. Prerequisite: Geometry

Description: Engineering Science is an engineering course designed to expose students to some of the major concepts and technologies that they will encounter in a postsecondary program of study in any engineering domain. Students will have an opportunity to investigate engineering and high-tech careers. In Engineering Science, students will employ science, technology, engineering, and mathematical concepts in the solution of real-world challenge situations. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will also learn how to document their work and communicate their solutions to their peers and members of the professional community **(Science Credit)**

80795 MST Biotechnology (H)**1 credit****Gr: 11-12****MST**

Prerequisite: Prior completion of one credit in a STEM or Health Science cluster course required and successful completion of Biology and Chemistry

Description: [MST only at NGHS] Students taking this course in 11th grade must take concurrently with Physics. This course provides an overview of biotechnology, bioengineering, and related fields. Topics include genetics, cell structure, proteins, nucleic acids, and the impact of immunological events in biotechnology. Students further study the increasingly important agricultural, environmental, economic, and political roles of bioenergy and biological remediation: the roles of nanoscience and nanotechnology in biotechnology medical research: and Future trends in biological science and biotechnology. This course earns science credit.

80753 MST Electronics (H)**1 credit****Gr: 11-12****MST****Prerequisite:** None

Description: [MST only at NGHS] Students will begin the study of electronic technology behind the telecommunications industry. Students will learn through lecture, labs, and training units. The course will encompass studies in direct current. Examples and lab focus will be on telephony equipment and data transmission. MST courses will require an application and acceptance into the magnet program

NOTE: All courses may not be offered on every campus.
 2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.



High School Course Guide



Science,
Technology,
Engineering &
Mathematics

80710 MST Engineering Design and Problem Solving I (R)

1 credit

Gr: 11-12

MST

Prerequisite: Geometry, and Algebra 1

Description: [MST only at NGHS] Engineering design is the creative process of solving problems by identifying needs and then devising solutions. Students use the engineering design process cycle to investigate, design, plan, create and evaluate solutions. Science aims to understand the natural world, while engineering seeks to shape this world to meet human needs and wants. Engineering design takes into consideration limiting factors or "design under constraint." The design process and problem solving are inherent to all engineering disciplines. This course reinforces and integrates skills learned in previous mathematics and science courses and emphasizes solving problems, moving from well-defined toward more open ended, with real-world application. Students apply critical-thinking skills to justify a solution from multiple design options. Additionally, the course promotes interest in and understanding of career opportunities in engineering and fosters awareness of the social and ethical implications of technological development. **(Science credit).**

80700 MST Engineering Design & Presentation II (R)

2 credits

Gr: 11-12

80705 MST Engineering Design & Presentation II (DC)

MST

Prerequisite: Engineering Design and Presentation I

Description: [MST only at NGHS] Engineering Design and Presentation II is a continuation of knowledge and skills learned in Engineering Design and Presentation I. Students enrolled in this course will demonstrate knowledge and skills of the design process as it applies to engineering fields using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Students will use a variety of computer hardware and software applications to complete assignments and projects. Through implementation of the design process, students will transfer advanced academic skills to component designs. Emphasis will be placed on using skills from ideation through prototyping.

80742 MST Engineering Mathematics (R)

1 credit

Gr: 11-12

MST

Prerequisite: Algebra II

Description: [MST only at NGHS] Engineering Mathematics is a course where students solve and model design problems. Students will use a variety of mathematical methods and models to represent and analyze problems that represent a range of real-world engineering applications such as robotics, data acquisition, spatial applications, electrical measurement, manufacturing processes, materials engineering, mechanical drives, pneumatics, process control systems, quality control, and computer programming. **[Math credit]**

80742 MST Engineering Science (R)

1 credit

Gr:

10-12

MST

Prerequisite: Algebra I and Biology, Chemistry, IPC or Physics. R. Prerequisite: Geometry

Description: Engineering Science is an engineering course designed to expose students to some of the major concepts and technologies that they will encounter in a postsecondary program of study in any engineering domain. Students will have an opportunity to investigate engineering and high-tech careers. In Engineering Science, students will employ science, technology, engineering, and mathematical concepts in the solution of real-world challenge situations. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will also learn how to document their work and communicate their solutions to their peers and members of the professional community **(Science Credit)**

80752 MST Project Based Research – STEM (R)

1 credit

Gr: 11-12

MST

Prerequisite: MST Electronics

Description: [MST offered only at NGHS] Students will develop knowledge and skills in the application, design, production, and assessment of technology. Course work reinforces, applies, and transfers academic knowledge and skills to a variety of interesting and relevant activities, problems, and competitions. MST courses will require an application and acceptance into the magnet program.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.



High School Course Guide



Science,
Technology,
Engineering &
Mathematics

80760 MST Project Lead the Way – Aerospace Engineering(R)

1 credit

Gr: 11-12

MST

Prerequisite: PLTW Introduction to Engineering Design

Description: [MST only at NGHS]. This course propels students' learning in the fundamentals of atmospheric and space flight. As they explore the physics of flight, students bring the concepts to life by designing an airfoil, propulsion system, and rockets. They learn basic orbital mechanics using industry-standard software. They also explore robot systems through projects such as remotely operated vehicles.

80750 MST Project Lead the Way - Civil Engineering and Architecture (R)

1 credit

Gr: 11-12

MST

Prerequisite: PLTW Principles of Engineering

Description: [NGHS only] Students learn about various aspects of civil engineering and architecture and apply their knowledge to the design and development of residential and commercial properties and structures. In addition, students use 3D design software to design and document solutions for major course projects. Students communicate and present solutions to their peers and members of a professional community of engineers and architects. This course is designed for 11th or 12th grade students.

80770 MST Project Lead the Way – Computer Integrated Manufacturing

1 credit

Gr: 10-11

MST

Prerequisite: PLTW Introduction to Engineering Design or Engineering Design

Description: [NGHS only] Open doors in any career with computer science! In CSE, students create apps for mobile devices, automate tasks in a variety of languages, and find patterns in data. Students collaborate to create and present solutions that can improve people's lives, and weigh the ethical and societal issues of how computing and connectivity are changing the world. This course aligns with the AP Computer Science Principles course.

80780 MST Project Lead the Way – Engineering Design & Development

1 credit

Gr: 12

MST

Prerequisite: PLTW Principles of Engineering

Description: [NGHS only] The knowledge and skills students acquire throughout PLTW Engineering come together in EDD as they identify an issue and then research, design, and test a solution, ultimately presenting their solution to a panel of engineers. Students apply the professional skills they have developed to document a design process to standards, completing EDD ready to take on any post-secondary program or career.

80730 MST Project Lead the Way – Introduction to Engineering Design (R)

1 credit

Gr: 9-12

MST

Prerequisite: None

Description: [NGHS only] this foundation course major focus is the design process and its application. Through hands-on projects, students apply engineering standards and document their work. Students use industry standard 3D modeling software to help them design solutions to solve proposed problems, document their work using an engineer's notebook, and communicate solutions to peers and members of the professional community.

80410 Practicum in STEM – Electronics, Robotics and Engineering (R)

2 credits

Gr: 12

Prerequisite: Algebra I and Geometry. R. Prerequisites: Two STEM courses.

Description: (only at SGHS) Practicum is designed to give students supervised practical application of previously studied knowledge and skills. Experiences occur in a variety of locations appropriate to the nature and level of experience. The student demonstrates professional standards as required by business and industry. The student demonstrates leadership and teamwork skills in collaborating with others to accomplish goals and objectives and apply critical thinking and problem solving. The student demonstrates technical knowledge and skills required to pursue a career in the science, technology, engineering, and mathematics cluster.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.

**80970 Practicum in STEM - Engineering (R)****2 credits****Gr: 12****Prerequisite:** Scientific Research and Design

Description: Practicum is designed to give students supervised practical application of previously studied knowledge and skills. Experiences occur in a variety of locations appropriate to the nature and level of experience. The student demonstrates professional standards as required by business and industry. The student demonstrates leadership and teamwork skills in collaborating with others to accomplish goals and objectives and apply critical thinking and problem solving. The student demonstrates technical knowledge and skills required to pursue a career in the science, technology, engineering, and mathematics cluster.

80973 Practicum in STEM - Engineering /Extended Practicum (R)**3 credits****Gr: 12****Prerequisite:** Scientific Research and Design

Description: Practicum is designed to give students supervised practical application of previously studied knowledge and skills. Experiences occur in a variety of locations appropriate to the nature and level of experience. The student demonstrates professional standards as required by business and industry. The student demonstrates leadership and teamwork skills in collaborating with others to accomplish goals and objectives and apply critical thinking and problem solving. The student demonstrates technical knowledge and skills required to pursue a career in the science, technology, engineering, and mathematics cluster.

80920 Practicum in STEM - Robotics (R)**2 credits****Gr: 12****Prerequisite:** Robotics II and Engineering Design and Problem Solving

Description: Practicum is designed to give students supervised practical application of previously studied knowledge and skills. Experiences occur in a variety of locations appropriate to the nature and level of experience. The student demonstrates professional standards as required by business and industry. The student demonstrates leadership and teamwork skills in collaborating with others to accomplish goals and objectives and apply critical thinking and problem solving. The student demonstrates technical knowledge and skills required to pursue a career in the science, technology, engineering, and mathematics cluster.

80923 Practicum in STEM - Robotics/Extended Practicum (R)**3 credits****Gr: 12****80925 Practicum in STEM (DC) ⓓ****Prerequisite:** Robotics II and Engineering Design and Problem Solving

Description: Practicum is designed to give students supervised practical application of previously studied knowledge and skills. Experiences occur in a variety of locations appropriate to the nature and level of experience. The student demonstrates professional standards as required by business and industry. The student demonstrates leadership and teamwork skills in collaborating with others to accomplish goals and objectives and apply critical thinking and problem solving. The student demonstrates technical knowledge and skills required to pursue a career in the science, technology, engineering, and mathematics cluster.

80100 Principles of Applied Engineering**1 credit****Gr. 9-12****Prerequisite:** None

Description: Principles of Applied Engineering provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students will develop engineering communication skills, which include computer graphics, modeling, and presentations, by using a variety of computer hardware and software applications to complete assignments and projects. Upon completing this course, students will have an understanding of the various fields of engineering and will be able to make informed career decisions. Further, students will have worked on a design team to develop a product or system. Students will use multiple software applications to prepare and present course assignments.

NOTE: All courses may not be offered on every campus.
 2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.



High School Course Guide



Science,
Technology,
Engineering &
Mathematics

80220 Robotics I (R)

1 credit

Gr: 10-12

Prerequisite: Concepts of Engineering Technology and Algebra I

Description: Students enrolled in this course will demonstrate knowledge and skills necessary for the robotic and automation industry. Through implementation of the design process, students will transfer advanced academic skills to component designs in a Project-based environment. The student develops an understanding of the advanced concepts of physics, robotics, and automation. Students will build prototypes or use simulation software to test their designs. Additionally, students explore career opportunities, employer expectations, and educational needs in the robotic and automation industry. The student develops an understanding of the characteristics and scope of manipulators and end effectors required for a robotic or automated system to function.

80900 Robotics II (R) (FALL)

1 credit

Gr: 11-12



Prerequisite: Concepts of Engineering Technology and Algebra I

Description: Students enrolled in this course will explore artificial intelligence and programming in the robotic and automation industry. Through implementation of the design process, students will transfer academic skills to component designs in a project-based environment. Student will build prototypes and use software to test their designs. (80910 Engineering Design and Problem Solving – Robotics in the Spring. Must sign up for both).

80380 Solid State Electronics (R)

1 credits

Gr: 11-12

80385 Solid State Electronics (DC) ⓓ

Prerequisite: AC/DC Electronics

Description: (SGHS only) Solid State Electronics allows students to advance their studies and skills in the electronics field. Through use of the design process, students will transfer advanced academic skills to component designs in a project-based environment. Topics of study include circuit application, robotics, microprocessors, optic electronics, voice sensors, high voltage, power supplies, amplifiers, oscillators, active devices, solid state applications, video and sound circuits, integrated circuits, television and radio theory and application, digital electronics, fundamentals of logic, and other areas of electronics found in the industry. Students completing this course are prepared to enter the electronics industry or pursue post-secondary training in the field of electronics technology.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

Garland Independent School District in support of school districts and Career and Technical Education Programs, does not discriminate on the basis of sex, disability, race, color, age or national origin in its educational programs, activities, or employment as required by Title IX, Section 504 and Title VI.