

RHS Technology Department

Department Introduction:

Technology, Design, Engineering, Computer Science

The scope of the Randolph High School Technology program spans from traditional woodworking and metals to drafting, architecture, engineering, robotics, remotely operated vehicles, computer science, cybersecurity, and game design. These courses are designed to teach key literacies and technical skills such as critical thinking and technology literacy that are critical for students to live and work in an interconnected global economy. Further, the computer science related courses will teach students to be computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design and problem solving.

Course Recommendation Process:

Teacher recommendation, classroom performance, and diagnostic assessments are the primary criteria for determining appropriate course levels. Parents may request consultation with the teacher and/or supervisor for further clarification regarding placement.

Summer Assignments:

Some courses, especially the AP courses, may require a summer assignment. Any assignment will be available either from the teacher prior to leaving school in June or will be available on the school website. These assignments will be communicated to the students who are enrolled in classes with a summer assignment requirement prior to leaving for summer break.

Technology, Design, Engineering, Computer Science

We believe students should be creators as well as consumers. With this philosophy in mind, our mix of courses allows students to work with a variety of materials to complete numerous projects. Additionally, courses incorporate the latest technologies including but not limited to 3D printers, laser engravers, virtual reality headsets, and associated design software.

Randolph's technology, design, engineering, and Computer Science curricula are aligned to the 2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills and Computer Science & Design Thinking.

Randolph High School offers a variety of technology, design, engineering, and computer science courses in the following categories:

Computer Science: Robotics I, Robotics II H, AP Computer Science Principles, AP Computer Science A, App Development Honors, Game Design, Cybersecurity I, Cybersecurity II H

Engineering: Drafting & Design, Principles of Engineering, Principles of Engineering (H), Remotely Operated Vehicles

Architectural Design: Drafting & Design, Advanced Drafting, Architecture I, Architecture II H, Home Improvement, Interior Design

Prototyping and 3D Printing: Drafting & Design, Advanced Drafting, Principles of Engineering (H), Technology & Design

Materials Processing: Basic Woods, Advanced Woods, Problem Solving in Woodworking, Basic Metals

Course Title (Code)	Grade Level	Course Length
Robotics I (TEC105)	9, 10, 11, 12	Semester
Robotics II H (TEC110)	10, 11, 12	Full Year
AP Computer Science Principles (TEC510)	9, 10, 11, 12	Full Year
AP Computer Science A (TEC500)	11, 12	Full Year
App Development Honors (TEC410)	10, 11, 12	Full Year
Drafting & Design (TEC120)	9, 10, 11, 12	Full Year
Advanced Drafting (TEC130)	10, 11, 12	Full Year
Technology & Design (TEC815)	9, 10, 11, 12	Semester
Principles of Engineering H (TEC170)	9, 10, 11, 12	Full Year
Principles of Engineering (TEC180)	9, 10, 11, 12	Full Year
Interior Design (TEC210)	9, 10, 11, 12	Full Year
Architecture I (TEC140)	9,10, 11, 12	Full Year
Architecture II H (TEC160)	10, 11, 12	Full Year
Basic Woods (TEC805)	9, 10, 11, 12	Semester
Advanced Woods (TEC810)	9, 10, 11, 12	Semester
Home Improvement (TEC100)	9, 10, 11, 12	Full Year
Problem Solving in Woodworking (TEC855)	10, 11, 12	Semester
Basic Metals (TEC190)	9, 10, 11, 12	Semester
Game Design (TEC220)	9, 10, 11, 12	Full Year
Cybersecurity I (TEC115)	9, 10, 11, 12	Semester
Cybersecurity II H (TEC125)	9, 10, 11, 12	Semester
Remotely Operated Vehicles (TEC200)	9, 10, 11, 12	Full Year

Course Descriptions:

Course Title: Robotics I (TEC105)	
Level/Grade: 9, 10, 11, 12	Length: Semester
	Pre-requisites: None
Course Description:	
<p>This semester course is designed as an introductory exploration to the world of VEX Robotics. You will explore mechanical design including gears and gear ratios. You will learn how robots are controlled both through direct real-time commands and in autonomous mode using block-based coding. Additionally, you will learn how robots can use sensors that allow them to obtain feedback from the real world and make decisions based on incoming data. You will also receive an introduction to simple circuits and how they can be used to create simple, cost-effective, smart devices that could be used at home.</p> <p>This course is part of Randolph High School's Computer Science & Programming Pathway.</p>	

Course Title: Robotics II H (TEC110)	
Level/Grade: 10, 11, 12	Length: Full Year
	Pre-requisites: Teacher recommendation
Course Description:	
<p>This year-long course will allow you to dive into the world of robotics, custom design, and programming. Working on challenges throughout the year, you will design and build robots "from the ground up." You will learn to transition programming from a block-based language to the more versatile and marketable skill of text-based coding. You will incorporate multiple sensors into your robotic designs and learn to program your robot to make decisions based on the real-world environment. You will also receive an introduction to industrial robotics using a three-degrees of freedom, mechanical arm.</p> <p>This course is part of Randolph High School's Computer Science & Programming Pathway.</p>	

Course Title: AP Computer Science Principles (TEC510)	
Level/Grade: 9, 10, 11, 12	Length: Full Year
NCAA Approved Core Course	Pre-requisites: Algebra I
Course Description:	
<p>This AP class is designed for any student with a passion for computer technology. Students do not need any background in coding. The objectives of the AP Computer Science Principles course is to introduce students to the central ideas of computer science, instilling the ideas and practices of computational thinking and inviting students to understand how computing changes the world. This course promotes deep learning of computational content, develops computational thinking skills, and engages students in the creative aspects of computer science. The course is unique in its focus on fostering students to be creative.</p> <p>This course is part of Randolph High School's Computer Science & Programming Pathway.</p>	

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Course Title: Cybersecurity I (TEC115)	
Level/Grade: 9, 10, 11, 12	Length: Semester
	Pre-requisites: None
Course Description: <p>The course is designed for students who are interested in exploring careers in Cybersecurity. The focus of instruction will include the implementation and monitoring of security on network and computer systems. Students will investigate strategies to identify and protect against security threats such as hackers, eavesdropping and network attacks. The basics of cryptography and logical reasoning will be explored. Hands-on labs in a cyber range provide practice in the configuration and mitigation of system vulnerabilities. Each unit integrates current events and related cyber ethics and law. *Ethics agreements must be signed by all students and parents during the first 2 weeks of class.</p>	

Course Title: Cybersecurity II H (TEC125)	
Level/Grade: 9, 10, 11, 12	Length: Semester
	Pre-requisites: Cybersecurity I
Course Description: <p>The course is second in a series designed for students who are interested in exploring careers in, and the foundations of Cybersecurity. Building on the concepts from Introduction to Cybersecurity, instruction will focus on vulnerabilities found in digital systems and methods to implement defense. Students will apply tools to identify vectors of attack and ways to mitigate vulnerabilities. Advanced forms of cryptography will be explored along with the role they play in securing remote transactions. Hands-on labs executed in a cyber range provide practice in the configuration and mitigation of system vulnerabilities. Each unit integrates current events with cyber ethics and law. *Ethics agreement must be signed by all students and parents during the first 2 weeks of class.</p>	

Course Title: AP Computer Science A (TEC500)	
Level/Grade: 11, 12	Length: Full Year
NCAA Approved Core Course	Pre-requisites: AP Computer Science Principles or Teacher Recommendation
Course Description: <p>In this Advanced Placement course, students will continue to develop computer programming techniques learned in previous classes as well as computer science topics determined by the College Board. College credits may be earned by taking the AP Exam in the spring. Major topics include JAVA programming methodology, features of programming languages, algorithms, computer systems, and responsible use of computer systems. Students are encouraged to take the AP Examination.</p>	

Note: This course may be taken to fulfill the mathematics graduation requirement of three years of mathematics.

This course is part of Randolph High School's Computer Science & Programming Pathway.

Course Title: App Development Honors (TEC410)	
Level/Grade: 10, 11, 12	Length: Full Year
NCAA Approved Core Course	Pre-requisites: AP Computer Science Principles
Course Description: This course is an elective to be taken within the course sequence of the computer science pathways program. Students will have the opportunity to explore the principles behind the development of mobile applications for Android and/or iOS using block or text-based development environments. During the first semester, students will explore the functionality of the integrated development environments available for working with mobile platforms, as well as learning the basic control structures and syntax available within their associated programming languages. For much of the course, students will develop small applications specific to certain functionality categories, including basic user interfaces, incorporation of digital media, drawing and animation, incorporation of built-in mobile phone sensors, social media integration, and web/Bluetooth connectivity. Lessons will be taught in conjunction with a course-long app development project, culminating with possible submission to the Apple App or Google Play stores and/or developer conferences. In the final weeks of the year, students will have the opportunity to perform independent research into extended areas of relevance, including augmented and virtual reality and eSports. This course is part of Randolph High School's Computer Science & Programming Pathway.	

Course Title: Drafting & Design (TEC120)	
Level/Grade: 9, 10, 11, 12	Length: Full Year
	Pre-requisites: None
Course Description: This is a "must" course for anyone interested any engineering. You will be introduced to the language of drafting and become familiar with the different branches of engineering. You will develop fundamental skills including drawing and the use of both 2D and 3D CAD (computer-aided drafting) programs.	

Course Title: Advanced Drafting (TEC130)	
Level/Grade: 10, 11, 12	Length: Full Year
	Pre-requisites: Drafting & Design

Course Description:

This is a full year course for any high school student who has completed Drafting and Design and would like to pursue advanced studies in drafting. In this course of study, students will gain a strong knowledge of two-dimensional and three-dimensional engineering CAD operations and design. Additionally, students will experience real world research and communications that are necessary to be successful in an increasingly technological world. Applications of mechanical design, industrial design, and model making will be explored.

Course Title: Technology & Design**Level/Grade:** 9, 10, 11, 12**Length:** Semester**Pre-requisites:** None**Course Description:**

This course is designed to actively involve you in the solution of technological problems. You will develop critical thinking skills using an interdisciplinary approach to problem solving. You will be involved in designing and the hands-on building of solutions to problems in the areas of energy systems, formulation technology, construction, and manufacturing.

Course Title: Principles of Engineering H (TEC170), A (TEC180)**Level/Grade:** 9, 10, 11, 12**Length:** Full Year**Pre-requisites:** None**Course Description:**

Principles of Engineering is a course that actively involves students to learn about the fundamentals of design and manufacturing. An understanding of the basic principles of mathematics and science, achieved primarily through hands-on activities, will help students develop solutions that make efficient use of manmade and natural materials. This course will help students realize the interrelatedness of history, economics, philosophy, ethics, and writing, which will prepare them for rigorous study in any of the fields of engineering.

For Honors Level: Students will be required to use original and critical thinking while working more independently on activities which incorporate advanced engineering principles.

Course Title: Interior Design (TEC210)**Level/Grade:** 9, 10, 11, 12**Length:** Full Year**Pre-requisites:** None**Course Description:**

The goal of the course is to introduce the student to the profession of interior design. Students will gain an understanding of the elements and principles of residential and commercial interior design. Students will learn to make appropriate selections of colors, fabrics, furnishings, lighting and

furniture. Students will develop skills in architectural drafting and space planning through the use of hand and computerized drafting techniques. Students will use measurements to scale rooms and create floor plans for a variety of spaces. Class projects include decorating sample rooms and designing floor plans. Students will also explore potential careers in the interior design and related fields.

Course Title: Architecture I (TEC140)	
Level/Grade: 10, 11, 12	Length: Full Year
NCAA Approved Core Course	Pre-requisites: None
Course Description:	
<p>Architecture I is designed to provide the basic skills necessary to produce a set of architectural plans for residential construction. A preliminary set includes a plot plan, foundation plan, first and second floor plans, door and window schedules, and a perspective drawing. You will continue to develop your skills using CAD (computer-aided drafting) throughout the year.</p>	

Course Title: Architecture II Honors (TEC160)	
Level/Grade: 11, 12	Length: Full Year
	Pre-requisites: Architecture I
Course Description:	
<p>In the second year of architectural drawing you will continue and enhance your CAD and table skills. You will continue to develop an individual portfolio of a complete set of architectural working drawings which will contain four elevation drawings, longitudinal and cross-sectional plans, and construction details. Architecture II relies extensively on CAD drawings. Portfolios developed in Architecture I will be the basis to begin the units of study in this course.</p> <p>Students will be required to use original and critical thinking while working more independently on activities which incorporate advanced architecture principles.</p>	

Course Title: Basic Woods (TEC805)	
Level/Grade: 9, 10, 11, 12	Length: Semester
	Pre-requisites: None
Course Description:	
<p>This semester course deals with the fundamental aspects of woodworking. Students will gain experience in shop safety, reading and preparing shop working drawings, wood identification and classification, using a variety of hand and power tools, basic wood joinery, and a variety of finishing procedures. Students will design and construct several woodworking projects that encompass good design, construction and finishing techniques.</p>	

Course Title: Advanced Woods (TEC810)	
Level/Grade: 9, 10, 11, 12	Length: Semester
	Pre-requisites: Basic Woods
Course Description:	
<p>This semester course deals with the fundamental aspects of woodworking. Students will gain experience in shop safety, reading and preparing shop working drawings, wood identification and classification, using a variety of hand and power tools, basic wood joinery, and a variety of finishing procedures. Students will design and construct several woodworking projects that encompass good design, construction and finishing techniques.</p>	

Course Title: Home Improvement (TEC100)	
Level/Grade: 9, 10, 11, 12	Length: Full Year
	Pre-requisites: None
Course Description:	
<p>This course will provide an overview of many construction, repair, and remediation activities that a homeowner often encounters. You will gain experience in shop safety and basic instruction in the following areas: carpentry, blueprints/design, measurements, sheetrock, painting/wall coverings, plumbing, electrical wiring, permits, tile, flooring, kitchen design, and the safe use of hand and power tools. This hands-on class will provide the future homeowner with the skills to become a knowledgeable consumer.</p>	

Course Title: Problem Solving in Woodworking (TEC855)	
Level/Grade: 10, 11, 12	Length: Semester
	Pre-requisites: Advanced Woods
Course Description:	
<p>This course is an opportunity for students who already have woodworking skills to engage in self-directed, sophisticated woodworking. Students will be provided challenging problems and will spend most of their time using a variety of materials, woodworking methods, and problem-solving strategies to create their own designs. Other materials and techniques may also be employed, such as soldering and sandblasting.</p>	

Course Title: Basic Metals (TEC190)	
Level/Grade: 9, 10, 11, 12	Length: Semester
	Pre-requisites: None
Course Description:	
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This course is an opportunity for students to explore manufacturing processes when working with metal. Students will be introduced to the following skills: foundry, sheet metal fabrication, casting, soldering, and brazing. The course is designed to allow all students the opportunity to exercise their creativity, to grow in self-confidence, and to experience the satisfaction that working in a uniquely challenging medium can provide. Students will study the properties of metals and learn how the application of heat and other forces can produce beautifully wrought, durable creations in the medium of metals.

Course Title: Game Design (TEC220)	
Level/Grade: 9, 10, 11, 12	Length: Full Year
	Pre-requisites: None
Course Description:	
<p>This course is for anyone who loves gaming and wants to design and build original games. Students will look at the components of a game, including storytelling, characters, and objects in the story. Popular game-development software as well as animation software will be used to create engaging, interactive games in a variety of styles. Students will learn through a variety of software including virtual board games, MS Make Code, Minecraft, and Unity.</p> <p>Further, students will not only experience their games on a traditional computer screen/monitor but will also have opportunities to experience them on a VR headset, where applicable.</p>	

Course Title: Remotely Operated Vehicles (TEC200)	
Level/Grade: 9, 10, 11, 12	Length: Full Year
	Pre-requisites: None
Course Description:	
<p>This year-long course is designed for students interested in Remotely Operated Vehicles (ROVs). You will delve into the world of drones, gaining hands-on experience with both small indoor drones and larger outdoor models. The course prepares you to take the TRUST exam, enabling you to fly drones as a hobbyist. Additionally, you will have the opportunity to build and operate an underwater ROV, exploring the fascinating underwater environment. This course offers a comprehensive, practical introduction to the exciting field of ROVs.</p>	

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