

## Technology and Engineering Education Department

Technology affects every aspect of our lives, from enabling citizens to perform routine tasks to requiring that they be able to make responsible, informed decisions that affect individuals, our society, and the environment. In response to the technological society that we live in, the Technology and Engineering Education department has focused on helping students become technologically literate. This goal is achieved through a project-based curriculum that focuses on design technology, problem-solving skills, and the practical application of math and science concepts in order to enhance critical and creative thinking.

### **COURSE #8330**

*Grade Level: 9- 12*

*Resolvable around Lab: Yes*

### **Graphic Design 1**

**Level: Non-weighted**

*Credits: 1.0*

Graphic Design I introduces the students to basic graphic communication processes. By employing fundamental design concepts such as the Elements of Design and the Principles of Design, the students will use image generation (Adobe Illustrator) and image manipulation (Adobe PhotoShop) software to design and reproduce solutions to graphic design problems. Additionally, the students will be introduced to the screen printing process by completing a single color print job, and a 2 color print job with registration. Adobe Illustrator and Adobe PhotoShop are part of the Adobe Creative Suite, which is the industry standard software suite for Graphic Design.

### **COURSE #8310**

*Grade Level: 10, 11, 12*

*Resolvable around Lab: Yes*

*Prerequisite: Graphic Design I*

### **Graphic Design 2**

**Level: Non-weighted**

*Credits: 1.0*

Graphic Design II expands on the concepts taught in Graphic Design I, with the focus of the course shifting from print to electronic media. Students will expand their use of the Elements of Design and the Principles of Design, to solve more complex graphic design problems. More advanced features of Adobe Illustrator and Adobe PhotoShop are explored, and basic web design techniques are introduced. Additionally, the students will have the opportunity to produce a 3 or 4 color screen printing project, with registration. The course concludes with the students having a web based, electronic portfolio with all their work from Graphic Design I and Graphic Design II included. This course is recommended for all students who are considering a career in the Graphic Design Industry.

**NOTE:** With approval from the instructor, students are permitted to retake, and receive credit for, Graphic Design II. Students who repeat this course develop an independent study program with the help of the instructor.

### **COURSE #8220**

*Grade Level: 9- 12*

*Resolvable around Lab: Yes*

### **Honors Robotics**

**Level: Honors**

*Credits: 1.0*

This course has been designed for students who would like to explore the rapidly expanding technologies involved in building, programming, and controlling robots. Through the use of the LEGO Mindstorm robotic kits, the students will build robots that use light, ultrasonic, sound, touch, and motion sensors to perform a variety of tasks. These skills are challenged through the LEGO Green City Challenge. Tetrix, an aluminum construction set, and RC controllers are introduced to the students to build stronger and more powerful robots. These robots require coding in the language RobotC. The course parallels Carnegie Mellon University's Robotics Academy.

### **COURSE # 8390**

*Grade Level: 9-12*

*Resolvable around Lab: Yes*

### **Manufacturing & Construction**

**Level: Non-weighted**

*Credits: 1.0*

The Manufacturing and Construction course is designed to use wood, wood substitutes, metals, and plastics in the manufacturing and construction of today's products. Student activities include an overview of the woodworking and metalworking industries, safe use of hand tools and machines, technical research product planning, problem solving, and experimentation in the manufacturing laboratory. Students participate in individual and group problems and activities.

## Technology and Engineering Education Department

### **COURSE # 8380**

### **Advanced Manufacturing and Construction**

**Level: Non-weighted**

Grade Level: 10, 11, 12

Credits: 1.0

Resolvable around Lab: Yes

Prerequisite: Manufacturing and Construction

Advanced Manufacturing and Construction challenges students to identify, research solution, and develop individual products with instructor approval. Group manufacturing and construction activities are used to teach the industrial process from concept through marketing and distribution with emphasis on efficiency, accuracy, and cooperative working. Students are encouraged to combine materials (wood, metal, plastics) in the design and production of products.

### **COURSE # 8250**

### **Honors Architectural & Interior Design 2**

**Level: Honors**

Grade Level: 10, 11, 12

Credits: 1.0

Resolvable around Lab: Yes

Prerequisite: Architectural & Interior Design I

This course involves advanced techniques in preparing house plans and the detailed construction of a to-scale house. Students work with square footage and room requirement limitations to design their house and then use the Computer-Aided-Design/Drafting (CADD) software to complete their drawings. Students will also prepare a series of Interior Design schemes for several rooms in their house. The students will construct a to-scale, 3 dimensional model of their houses.

### **COURSE # 8400**

### **TV & Video Production 1**

**Level: Non-weighted**

Grade Level: 9-12

Credits: 1.0

Resolvable around Lab: Yes

This hands-on course allows students to plan and design effective visual media. Students will have the opportunity to use state-of-the-art Adobe Premiere video editing software, iMac Computers, and various cameras to complete in class assignments. Assignment topics include, but are not limited to; How To Videos, Music Videos, and Public Service Announcements. Additionally, students will learn how to utilize Lighting, Shot Angles and Styles, Storyboarding and Blue / Green Screening techniques used in professional broadcasting and movie making industries.

### **COURSE # 8410**

### **TV & Video Production 2**

**Level: Non-weighted**

Grade Level: 10, 11, 12

Credits: 1.0

Resolvable around Lab: Yes

Prerequisite: TV & Video Production I

This course expands and dives further into the student knowledge gained in TV and Video 1. Students will create visual media on a more sophisticated level. Students will get the chance to film and edit various activities that go on throughout the school year at Neshaminy including, sporting events, school plays, Gym Night and Powder puff which have the potential to be shown on the Neshaminy Channel or on TV during school lunch hours. Students are also required to, and are responsible for, directing and producing the Neshaminy morning announcements. This will necessitate being in the TV & Video Homeroom. Finally, students will learn about various topics including infomercials, commercials and how to conduct, perform and edit interviews which are used in various segments, such as "Teacher / Student of the Week", "This Week in the News" and "Mad Reviews" seen on the school announcements.

### **COURSE # 8370**

### **Power, Energy & Transportation 1**

**Level: Non-weighted**

Grade Level: 9- 12

Credits: 1.0

Resolvable around Lab: Yes

In this hands-on, activity based course, students will explore a variety of transportation systems and the power and energy systems associated with them. Students will use the "Technological Design Process" to master these concepts through various projects including, but not limited to, magnetic levitation trains, mouse trap cars, model rocketry, boat hull design, marble mazes, and CO<sub>2</sub> dragsters. Students in this course will also gain skills and practical experience working safely with the basic tools and machines found in the materials lab.

## Technology and Engineering Education Department

### **COURSE # 8360**

Grade Level: 10, 11, 12

Resolvable around Lab: Yes

Prerequisite: Power, Energy & Transportation I

### **Power, Energy & Transportation 2**

**Level: Non-weighted**

Credits: 1.0

This advanced level of Power, Energy and Transportation continues to examine the different systems introduced in the Level I course. More advanced and complicated subsystems are explored. Topics include the transmission of power and energy, fuel management, gears, belt drives, electrical currents, solar energy, aerodynamics, hydraulic, pneumatic and mechanical power systems. Activities include, but are not limited to, gear driven cars, hydraulic lifting devices, solar-powered vehicles and ATV's. Students also have the opportunity to further develop skills associated with the basic tools and machines found in the materials lab.

## **ENGINEERING ACADEMY**

The Neshaminy Engineering Academy represents a sequence of courses that are designed to develop a student's ability to solve problems and think critically and creatively by completing hands-on activities that are based on real world problems. The core of the Academy addresses the educational needs of students planning on a post high school educational program at a 2 or 4 year college, leading to a career in engineering or engineering technology, but the program is open to all students. The courses offered in the Engineering Academy are part of a pre-engineering program called Project Lead the Way (PLTW). This project is a nationwide program that has aligned the participating schools with major universities across the country to provide a greater advantage to those students who feel they may be interested in pursuing a career in engineering, architecture and design-related fields. The courses are designed to expose the student to a vast world of engineering through various experiential learning scenarios. Colleges that offer engineering as a major look favorably upon students that have taken PLTW coursework as part of the admission cycle.

### **COURSE #8205**

Grade Level: 9- 12

Resolvable around Lab: Yes

### **Honors Introduction to Engineering Design**

**Level: Honors**

Credits: 1.0

This course is a hands-on, activity based course that develops students' problem solving and critical thinking skills through the application of the design process. In this course, students use 3D solid modeling design software to help them design solutions to solve proposed problems. Students will learn how to document their work and communicate solutions to peers and members of the professional community. Various engineering & technical career opportunities are explored and discussed.

**NOTE:** This course is intended to be the first course in the PLTW sequence.

### **COURSE # 8215**

Grade Level: 10, 11, 12

Resolvable around Lab: Yes

### **Honors Principles of Engineering**

**Level: Honors**

Credits: 1.0

Principles of Engineering (POE) is an introductory engineering course designed to provide students with hands-on experiences in a variety of engineering areas. In the Energy & Power unit, students will build simple and complex machines, gear trains, electrical circuits, solar and hydrogen fuel cell vehicles and a winch system. In the Materials & Structures unit, students will investigate structures, build and test virtual bridges, balsa trusses and analyze material properties. Students will also build and program robotic vehicles and projects, explore and build hydraulic and pneumatic fluid systems in the Control Systems unit. Projectile motion is covered in the Kinematics part of the course and includes virtual and actual projectile launches as well as statistics and probability lessons. POE emphasizes problem-solving skills and integrates the study of science, technology, engineering and math (STEM). This course provides students with a comprehensive overview of many engineering fields.

# Technology and Engineering Education Department

## ENGINEERING ACADEMY CONTINUED

### **COURSE # 8260**

*Grade Level: 9-12*

*Resolvable around Lab: Yes*

### **Honors Civil Engineering and Architecture**

**Level: Honors**

*Credits: 1.0*

Students will complete hands-on projects that involve the development of property sites and civil structures. In this course students will face the same real life scenarios that civil engineers and architects encounter on a daily basis in order to learn the principles and practices of civil engineering and architecture. This will be accomplished through team and individual work. The students will also use 3D design software to help them develop solutions to course assignments. The major areas of focus are land surveying, water resources and management, environmental issues, soil testing, architectural building design, landscape design, model building and structural strength of materials.

### **COURSE # 8350**

*Grade Level: 10, 11, 12*

*Resolvable around Lab: Yes*

### **Honors Computer Science and Software Engineering**

**Level: Honors**

*Credits: 1.0*

Computer Science and Software Engineering (CSE) will develop computational thinking skills in order to solve open ended, practical problems that occur in the real world. The course focuses on introducing students to object oriented programming environments, specifically the Python language. Students will eventually code their own applications for use on a provided Android tablet. Students will also have the opportunity to create interactive web 2.0 software working with HTML5, CSS, and JavaScript.

### **COURSE # 8300**

*Grade Level: 10, 11, 12*

*Resolvable around Lab: Yes*

### **Honors Digital Electronics**

**Level: Honors**

*Credits: 1.0*

Digital Electronics (DE) provides the foundation for all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, and HDTV. The major focus of the DE course is to expose students to electronics laws and concepts, design processes, and engineering standards. Students will gain experience with a variety of hands-on activities including soldering, bread-boarding of circuits, and programming Arduino-based robots. Students will use industry-standard software to plan, simulate, test and troubleshoot various digital logic circuits.

