



Program of Academic Studies

2014–2015

**A Course Selection Guide for
Grade 9 • Grade 10 • Grade 11 • Grade 12**

**North Penn High School
Pennbrook Middle School
Penndale Middle School
Pennfield Middle School**

Please note: June 13, 2014 is the final deadline for student and/or parent initiated requests for course changes.

elective course covers both Microeconomics and Macroeconomics. By examining the role of individuals in the economy, the course makes economics relevant to the student's world. The course also examines the role of the government in society's economic activities. Some of the areas covered are production; supply and demand; forms of business organizations and competition; taxes; stocks and bonds; unemployment; money supply; and current economic trends/events.

TOPICS IN AMERICAN LIFE

[Juniors & Seniors] (6 periods – 0.5 credit)
Level 4.0 (IEP required for enrollment) **1862**
Level 4.0 (IEP required for enrollment) **1863**
Level 4.0 **1864**
Level 5.0 **1865**
Level 6.0 **1866**

This semester elective course provides a relevant and balanced analysis of the major trends, issues, and challenges that face our society today, or may face in the future. Students will work to develop an understanding of the historical foundation of these issues; the interconnected nature of these issues; and the impact each of these issues has on American life. Students will be given opportunities to actively research, discuss, and assess the contemporary political, economic, social, and cultural issues that influence American life.

SURVEY OF WORLD RELIGIONS

[Juniors & Seniors] (6 periods – 0.5 credit)
Level 5.0 **1875**
Level 6.0 **1876**

This semester elective course examines the major religions of the world: Hinduism, Buddhism, Judaism, Christianity, and Islam. The course begins with a study of the origin of the concept of religion and how people of different religions have tried to make sense of the mysteries of human existence. Instruction includes an historical development of each religion, and analysis of major writings and teachings, and an examination of major events and important figures. Historic and contemporary religious conflicts will also be examined. Instruction includes a historical development of each religion and the analysis of major writing; teachings and doctrines; as well as events and figures.

Technology and Engineering Education

The Technology Education curriculum presents courses in Communications, Power/Transportation, and Manufacturing and Construction Technologies. Specific course offerings include Mechanical Drawing, Graphic Communications (Printing), Manufacturing and Construction, Electricity/Electronics, and Principles of Technology. Courses are designed to assist students to understand industry and technology and to make informed and meaningful educational and career choices.

Major Electives

GRAPHIC COMMUNICATION SYSTEMS **5034**
Level 4.0 (6 periods – 1 credit)

Communication systems technology introduces students to many ways information is produced, used, and exchanged through printed and electronic media. Students learn and use graphic communication, desktop publishing, graphic arts, photography, CAD, and graphic design as they complete individual and group activities in screen printing and offset printing. Students investigate other printing processes as well as the industries that support them. Students explore electronic communications through the video

editing module, audio/video module and digital camera. Students also use computer programs such as Adobe Illustrator, Adobe InDesign, Adobe Photoshop, Apple Works and assorted other programs to generate copy for the activities. The products include: T-shirts, signs, mirrors, tote bags, pictures, mugs, etc. in screen printing process; in offset printing: business cards, letterheads, memo pads, booklets, brochures, and our schools literary magazine.

ADVANCED GRAPHIC COMMUNICATION SYSTEMS **5044**
Level 4.0 [Juniors & Seniors] (6 periods – 1 credit)

Advanced students build on the knowledge gained in the level 1 course as they complete more in-depth and challenging assignments. Emphasis is placed on the use of the computer in the exploration and completion of activities such as: halftones, duotones, posterization, flat multi-color and process color printing in both screen printing and offset printing. Also included are more advanced desktop publishing activities such as booklets and brochures.

Prerequisite: Graphic Communication Systems or a teacher recommendation from the minor level

Note: With the approval of the instructor and submission of the independent study proposal to the building principal by May 1st, students may request a third year of Communication Systems Technology.

MANUFACTURING AND CONSTRUCTION **5134**
Level 4.0 (6 periods – 1 credit)

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.

ADVANCED MANUFACTURING AND CONSTRUCTION **5144**
Level 4.0 [Juniors & Seniors] (6 periods – 1 credit)

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.

Prerequisite: Manufacturing and Construction

Note: With the approval of the instructor, and submission of the independent study proposal to the building principal by May 1st, students may request a third year of Advanced Manufacturing and Construction.

PRINCIPLES OF TECHNOLOGY  **5234**
Level 4.0 (6 periods – 1 credit)

In this introductory course, students explore the physical principles underlying modern technology. Demonstrations, discussions, large and small group activities, and "hands-on" activities are based on the principles of force, work, rate, and resistance as they apply to mechanical, fluid, electrical and thermal systems. Technical content area reading skills are taught in conjunction with the high school reading specialist. This course is designed for students interested in a technical career, and meets the requirement for science credit.

Prerequisite: Algebra 1

PRINCIPLES OF TECHNOLOGY  **5235**
Level 5.0 (6 periods – 1 credit)

In this academically challenging course, students explore the physical principles underlying modern technology. Demonstrations, discussions, large and small group activities and “hands-on” activities are based on the principles of force, work, rate, and resistance as they apply to mechanical, fluid, electrical and thermal systems. This course meets the requirement for science credit and prepares students for pursuing post-secondary degrees in an engineering/technical field.

Prerequisite: Algebra 1

MECHANICAL DRAWING: ARCHITECTURE/MACHINE/ELECTRONICS **5334**
Level 4.0 (6 periods – 1 credit)

Mechanical Drawing is a course designed to teach how to communicate ideas through engineering graphics/technical drawings. Students will study architecture and mechanical (machine) drawing styles. Students develop engineering and architectural skills by using current industry used software applications as they complete a series of activities. The course is divided into architecture-based and mechanical-based project based learning activities. Students will use variety software to explore the 2D and 3D realms while developing an understanding for standardized drawing communication. Mechanical Drawing is highly recommended to all students considering careers in engineering, architecture or design related fields.

***There are no course pre-requisites for this course.*

ADVANCED MECHANICAL DRAWING **5344**
Level 4.0 [Juniors & Seniors] (6 periods – 1 credit)

Advanced Mechanical Drawing Students continue to develop skills and background within several areas from the previous year. Areas of study include Mechanical (machine) and Architectural drawing. All students use Computer-Aided-Drafting (CAD) software to develop a series of drawings in all areas. The various software packages will allow the student to develop 3-D images with full color rendering and modeling capabilities. Students work on both independent and team projects along with the required drawing assignments.

Prerequisite: Mechanical Drawing or Introduction to Engineering Design

Note: With the approval of the instructor, and submission of the independent study proposal to the building principal by May 1st, students may request a third year of Advanced Mechanical Drawing. Such students develop an independent study program with the help of the instructor.

ELECTRICITY/ELECTRONICS **5434**
Level 4.0 (6 periods – 1 credit)

This course is designed to explore the fundamentals of electricity and electronics and its effects on a technologically changing world. Student centered activities include basic principles of electricity, direct current, solid state devices, alternating current, residential wiring, home/mobile audio and video systems, and career opportunities in the electricity and electronics field. Classroom theory is reinforced through comprehensive laboratory exercises which include designing, and testing a wide variety of circuits. Experimentation, circuit design and construction, and troubleshooting skills are enhanced through the use of industry leading circuit simulation and experimentation software. This course is designed for students interested in technical, industrial, engineering, or military careers in electronics or for those interested in the computer sciences field.

ADVANCED ELECTRONICS **5445**
Level 5.0 [Juniors & Seniors] (6 periods – 1 credit)

The Advanced Electronics course is designed for students to further expand their knowledge of electricity and electronics. An in-depth study of power supply design and construction from the component level is utilized to reinforce DC and AC theories and applications. The use of analog and digital meters, oscilloscopes, and power supplies in conjunction with Integrated circuits (chips), audio and video circuits, digital theory, and computer applications help to reinforce the knowledge and skills acquired. Experimentation, circuit design and construction, and troubleshooting skills are enhanced through the use of industry leading circuit simulation and design software.

Prerequisite: Electricity/Electronics or Digital Electronics

Note: With the approval of the instructor, and submission of the independent study proposal to the building principal by May 1st, students may request a third year independent study program or with a final grade of a “B” or better, students may elect to take the **Digital Electronics** course.

Minor Electives

COMMUNICATIONS SYSTEM (2 periods – 0.3 credit) **8500**

The Communications System minor is designed to explore the basic methods used to produce, use and exchange information. Students use the computer to create a product by screen printing and lithography. Students explore electronic communications through an audio/video module, video editing module, digital photography along with other forms of communication and the industries that support them.

MANUFACTURING AND CONSTRUCTION MATERIALS MINOR (2 periods – 0.3 credit) **8510**

The Manufacturing and Construction Minor provides the opportunity to explore woodworking and metalworking as students design, develop, and construct projects in selected areas of interest. Students use handtools, portable power tools, and machinery as they complete individual/group activities in the Manufacturing Laboratory.

POWER TECHNOLOGY MINOR (2 periods – 0.3 credit) **8520**

The Power Technology Minor consists of a survey of energy, power, and transportation. Human muscle, simple and compound machines, gears, levers, pneumatics and hydraulics, internal combustion engines, automotive, aviation, and rocketry are explained. Future modes of energy, power, and transportation, such as: alternative energy sources and power systems, magnetic levitation, solar vehicles, and tidal energy stations are studied. Student activities include laboratory activities and hands-on experiences.

MECHANICAL DRAWING MINOR (2 periods – 0.3 credit) **8530**

Mechanical Drawing Minor is an introductory course enabling students to explore and develop technical drawing skills. Students complete a variety of drawings as they learn to use the instruments of a draftsman. Emphasis is placed on basic drawing skills, simple machine drawings, and architectural floor plans.

Engineering Academy

The Engineering Academy represents a course sequence that addresses the educational needs of students planning on a post high school educational program in a two or four year college leading to a career in engineering or engineering technology. The courses offered in the Engineering Academy are part of pre-engineering program called Project Lead the Way. Project Lead the Way 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 the engineering/architecture/design-related fields. The courses are designed to expose the student to the vast world of engineering through various experiential learning scenarios. Colleges that offer engineering as a major look favorably upon students that have taken the PLTW coursework as a part of the admission cycle. The Engineering Academy is for any 5.0 or 6.0 level student who is contemplating a career in Engineering. **Students who wish to enroll in The Engineering Academy must complete the application available from guidance counselors.**

INTRODUCTION TO ENGINEERING DESIGN (IED) 5455 **Level 5.0** (6 periods – 1 credit)

Introduction to Engineering Design is an introductory course that develops students' problem-solving and critical-thinking skills and emphasizes the concepts of developing three-dimensional models and solid renderings of an object. Students focus on the application of visualization processes and tools provided by current, state-of-the-art computer hardware and software programs. IED emphasizes the design-development process of a product and how a product model is produced, analyzed, and evaluated, using a Computer-Aided Design System. Various design applications and possible career opportunities are explored and discussed in detail.

Note: This course is a requirement for Grade 10 students in The Engineering Academy.

PRINCIPLES OF ENGINEERING (POE) 5465 **Level 5.0** (6 periods – 1 credit)

Principles of Engineering is a broad-based survey course designed to help students understand the field of engineering and engineering technology and its unlimited and diverse career opportunities. Students continue the development of problem-solving and critical-thinking skills required in their post-secondary pursuits and engineering careers. In exploring various and numerous engineering systems and manufacturing processes, the students also learn how engineers address concerns about the social and political consequences of technological changes. Through theory, guest speakers, field trips, and hands-on problem-solving activities, students experience firsthand what engineering is all about and are able to answer this question: "Is a career in engineering or engineering technology for me?"

Prerequisite: This course is highly suggested for grade 10 students or any first year student entering the Engineering Academy. This course can be taken simultaneously with Intro to Engineering Design or Digital Electronics.

DIGITAL ELECTRONICS 5475 **Level 5.0** (6 periods – 1 credit)

Digital Electronics is a course of study in applied digital logic and is patterned after first semester digital electronics courses taught in two and four year post secondary schools typically found in watches, calculators, video games, and computers, and they utilize Boolean logic in the solution of problems. Smart circuits are present in virtually all parts of our lives, and their use is rapidly increasing, making DE a critical course of study for any student pursuing a career in engineering/engineering technology. Using the latest software systems available to industry, students also test and analyze simple and complex digital circuitry. Students design circuits; export their designs to a printed circuit autorouting program that generates printed circuit boards; and construct designs, using chips and other DE components. Course is for Grade 11 Engineering Academy students.

Prerequisite: This course is for grade 11 Engineering Academy

students or those students who have successfully taken Intro to Engineering Design and Principles of Engineering courses. This course can be taken simultaneously with Principles of Engineering or Computer Integrated Manufacturing. Students who have completed Advanced Electronics may take this course.

COMPUTER INTEGRATED MANUFACTURING (CIM) 5485 **Level 5.0** [Juniors & Seniors] (6 periods – 1 credit)

The Computer-Integrated Manufacturing course builds upon the solid-modeling and three-dimensional skills students developed in Introduction to Engineering Design. Students solve design problems, using state-of-the-art Computer-Assisted Design software programs. They evaluate their solutions, using mass-property analysis (relationship study of the design, function, and materials); determine appropriate modifications; and use prototyping equipment in producing a three-dimensional model of the solution. Students present the progress and results of their work through oral and portfolio-quality written communications. Course is for Grade 11 and 12 Engineering Academy students.

Prerequisite: Successful completion of courses associated with The Engineering Academy including Introduction to Engineering and Design and Principles of Engineering. This course can be taken simultaneously with Digital Electronics or Engineering Design and Development.

ENGINEERING DESIGN AND DEVELOPMENT (EDD) 5495 **Level 5.0** [Seniors] (12 periods – 1.5 credit)

In the Engineering Design/Development course, students continue the development of their teamwork skills by working in teams of two to four to select, design, and construct a solution to an engineering problem. The project requires the application of theories, principles, and processes learned in the previous four courses. The design problem may be selected from a database of engineering problems, a recognized national/global concern/challenge, or an original engineering problem identified by the team and approved by the PLTW Partnership Team and staff. The scope of the problem should involve a wide range of engineering applications (e.g., school robot-mascot, automated solar water heater, remote-control hovercraft). The students' portfolios consist of a journal, oral/written progress reports, and final oral/written presentations of their projects to their peers and a panel selected from the Partnership Team. The portfolio is an invaluable asset to students as they go through the college-admissions process.

Note: Course is for Grade 12 Engineering Academy students as it is part of the final component of The Engineering Academy. Students enrolled in this course will have their lunch embedded in the twelve periods per cycle and should not select lunch on their course card. About twenty minutes will be allocated for student lunch daily.

Prerequisite: Successful completion of courses associated with The Engineering Academy including Introduction to Engineering and Design, Principles of Engineering, Digital Electronics and Computer Integrated Manufacturing.