TECHNOLOGY EDUCATION

Technology education curriculum makes science, technology engineering and mathematics (STEM) relevant for students by engaging in hands-on activities, real-world projects. Students understand how the skills they are learning in the classroom can be applied in everyday life. This style of activity/project based learning increases student motivation and higher-order thinking, which results in higher academic success.

Project based instructional strategies encourage teamwork, logical thinking, leadership, problem solving, time management, data collection, research, multimedia communication and public speaking. This style of learning engages the class and adds relevance and rigor to the learning process. The culmination of these experiences will help our students with college and career decisions.

To help with the career decisions and planning, courses are offered in a variety of areas. These areas include career exploration, materials processing, energy and transportation, engineering, communications and computers.

Students Enrolled in Technical Education classes qualifies them to participate in the Technology and/or STEM Clubs.

<table>
<thead>
<tr>
<th>Articulation</th>
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<tr>
<td>OPHS</td>
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<tr>
<td>Tech. Drawing + CEA</td>
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Students pursuing an Advanced Regents diploma may choose to complete 1 unit of Foreign Language AND one of the 5-unit alternative sequences above. Please see Graduation Requirements, page 1.
# Technology Education Course Offerings

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<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grade Levels</th>
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<tr>
<td>0801</td>
<td>Entrepreneurship in Production Systems</td>
<td>1</td>
<td>9,10,11,12</td>
<td>5</td>
<td>V L</td>
<td></td>
</tr>
<tr>
<td>+ 0840</td>
<td>Communication Systems</td>
<td>½</td>
<td>9,10,11,12</td>
<td>5</td>
<td>V L</td>
<td></td>
</tr>
<tr>
<td>0825</td>
<td>Energy</td>
<td>½</td>
<td>9,10,11,12</td>
<td>5</td>
<td>V L</td>
<td></td>
</tr>
<tr>
<td>+ 0843</td>
<td>Entrepreneurship in Graphic Communications</td>
<td>1</td>
<td>9,10,11,12</td>
<td>5</td>
<td>V L</td>
<td></td>
</tr>
</tbody>
</table>

| +^ 0850       | Technical Drawing                                                            | ½       | 9,10,11,12   | 5        | V L      |
| + 0864        | Drawing & Design for Production (DDP)                                          | 1       | 9,10,11,12   | 5        | V L      |
| 0700          | Media Productions                                                             | 1       | 9,10,11,12   | 5        | V L      |
| 0810          | Woodworking Technology                                                        | ½       | 9,10,11,12   | 5        | V L      |
| + 0811        | Construction Technology                                                       | 1       | 9,10,11,12   | 5        | V L      |
| 0812          | Furniture Production                                                          | ½       | 10,11,12     | 5        | V L      |
| 0815          | Home Maintenance &Repair                                                      | ½       | 9,10,11,12   | 5        | V L      |
| 0820          | Basic Auto Maintenance                                                        | ½       | 10,11,12     | 5        | V L      |
| 0821          | Small Engine Technology                                                       | ½       | 9,10,11,12   | 5        | V L      |
| ^ 0830        | Photography I                                                                 | ½       | 9,10,11,12   | 5        | V L      |
| 0831          | Photography II                                                                | ½       | 9,10,11,12   | 5        | V L      |
| ^ 0832        | Digital Imagery /Photoshop                                                     | ½       | 9,10,11,12   | 5        | V L      |
| ++* 0841      | Computer Applications                                                         | ½       | 9,10,11,12   | 5        | V L      |
| ** 0842       | Communications Systems/Computer Applications                                  | 1       | 9,10,11,12   | 5        | V L      |
| + 0844        | Computer Aided Drawing                                                        | ½       | 9,10,11,12   | 5        | V L      |
| + 0845        | Computer Integrated Manufacturing (CIM)                                        | ½       | 9,10,11,12   | 5        | V L      |
| ^ 0852        | Civil Engineering and Architecture (CEA)                                      | 1       | 10,11,12     | 5        | V L      |
| 0853          | Architectural Model Making                                                    | 1       | 11,12        | 5        | V L      |
| 0865          | Principles of Engineering (POE)                                               | 1       | 11,12        | 5        | V L      |

- College credit may be earned.
- College credit for combined course numbers 0830 with 0832 and 0850 with 0852.
- This course will be required for all students who plan to receive a 5 unit combination in Technology Education.
- This course may be used to fulfill the ½ Art/Music and ½ Computer requirements for graduation.
- Courses with this sign can be applied to the Art/Music requirement for high school graduation.
- This course will fulfill the ½ unit computer requirement for graduation.
Career Exploration
Production Systems (0801)

Materials Processing
Woodworking Technology (0810)
Construction Technology (0811)
Furniture Production (0812)
Home Maintenance & Repair (0815)

Energy and Transportation
Small Engine Technology (0821)
Basic Auto Maintenance (0820)
Energy (0825)

Engineering
Computer Aided Drawing (CAD) (0844)
Computer Integrated Machining (CIM) (0845)
Technical Drawing (0850)
Civil Engineering and Architecture (CEA) (0852)
Architectural Model Making (0853)
Drawing for Design Production (DDP) (0864)
Principles of Engineering (POE) (0865)

Communications
Media Productions (0700)
Photo I (0830)
Photo II (0831)
Digital Imagery & Photo (0832)
Communications Systems (0840)
Communications Systems/Computer Applications (0842)

Computers
Computer Applications (0841)
Graphic Communications (0843)

Students pursuing an Advanced Regents diploma may choose to complete 1 unit of Foreign Language AND one of the 5-unit alternative sequences above.
Please see Graduation Requirement, page 1.
Material Processing Courses

**0801 ENTREPRENEURSHIP IN PRODUCTION SYSTEMS**
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various
Prerequisite: none

In Entrepreneurship in Production Systems, students will apply entrepreneurial ideas to a product design and develop a business plan to form a corporation. The company develops the system to manufacture and sell the product. Students will be introduced to the design and production process as well as the business and marketing process. Units will consist of design, development, prototyping, production, marketing, and sales. They will be involved in every aspect of the process. Students will be using many different computer programs in design process, machine tools in the production process, and video equipment, video editing software, Adobe Photoshop, Adobe Illustrator in the marketing process. The products created in this class will primarily be fabricated from wood and other easily machined materials.

**0810 WOODWORKING TECHNOLOGY**
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various
Prerequisite: none

Woodworking Technology is a basic course where students will work on hands-on activities to fabricate and manufacture various wood products. Activities will include project problem solving, building prototypes and assembly line production.

**0811 CONSTRUCTION TECHNOLOGY**
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various
Prerequisite: none

Construction Technology is a program in the construction of residential buildings. Students will experience the planning and construction of structures using a variety of materials, tools and equipment. Activities will include building full size millwork structures. Students will learn to work with blueprints as well as listing and estimating materials. Students will also explore career possibilities in the residential construction industry.
0812 FURNITURE PRODUCTION
Grade: 10, 11, 12
20 weeks/5 meetings per week – ½ unit
Exam: local
Reading Level: various
Prerequisite: instructor’s approval
Furniture Production is a woodworking course that will teach students the processes involved in the production of furniture. This course is designed to involve the students in realistic hands-on research and the development of fine crafted wood products. Students, working from plans and materials lists, will build models for production. The emphasis of the course will be students fabricating and constructing a major individual project. Students will be assessed a materials and supplies fee based on their project and may be required to obtain outside materials.

0815 HOME MAINTENANCE AND REPAIR
Grade: 9, 10, 11, 12
20 weeks/5 meetings per week – ½ unit
Exam: Local
Reading Level: various
Prerequisite: none
Home maintenance and repair is an elective course for students who want to learn how to do their own repairs and maintenance around the house. The program will show the student how to save time, money and avoid frustration when making household repairs. After learning about tools, the course will provide knowledge, skills and hands-on activities in the care and repair of plumbing, doors and windows, concrete, electrical, heating systems, insulation and many other household areas.

STEM/Engineering Courses

0844 COMPUTER AIDED DRAWING (CAD)
Grade: 9, 10, 11, 12
20 weeks/5 meetings per week - ½ unit
Exam: local
Reading Level: various
May earn college credit (see pg. 83)
Prerequisite: Technical Drawing or DDP is recommended.
This STEM course is intended for students who are interested in further expanding knowledge and skills in computer aided design (CAD). During this class, students will engage in many aspects of beginning engineering. Solidworks is the solid modeling software utilized to draft 3D machine parts, animated computer models, create ANSI/ISO standard drawing sheets, assemblies and animations. Students will also output drawings to a 3-D printer, which prints the CAD drawing as a 3-D model in ABS plastic. This course is recommended for those students who are considering the POE class and is required for the Computer Integrated Manufacturing (CIM) class.
**0845 COMPUTER INTEGRATED MANUFACTURING (CIM)**
Grade: 9, 10, 11, 12  
Exam: local  
Reading level: various  
**Prerequisite:** CAD

Computer Integrated Manufacturing (CIM) is a STEM course which starts from the ground up by teaching microprocessors and programming. Students learn about logic and analogue inputs and control circuits. From this experience, the students model, design, test and fabricate a computer-controlled machine. CAD models of the machine parts are used by MasterCam, a CAM software, used to generate numerical code that our CNC router needs to fabricate the parts. Many of the parts may be fabricated from CAD drawings utilizing our 3-D printer. The parts are used to construct the microprocessor-controlled project. This real life experience teaches teamwork, logical thinking and problem solving skills that are essential for the student interested in engineering.

**0850 TECHNICAL DRAWING**
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various  
**Prerequisite:** none

Technical Drawing is a basic STEM course in instrumental drawing. It covers a wide range of experiences in the use of drafting instruments, scales and types of drawing. This course can serve as a basis for advanced work in drafting. Instruction will include layout, lettering, geometric construction, dimensioning, auxiliary and cross-section views, multi-view, development, and pictorial drawings. Students are also introduced to Computer Aided Drawing (CAD) and drafting/design career choices.

**0852 CIVIL ENGINEERING AND ARCHITECTURE (CEA)**
Grade: 10, 11, 12  
Exam: local  
Reading Level: various  
**Prerequisites:** Technical Drawing and grade level requirement

Civil Engineering And Architecture (CEA) is a yearlong STEM course that provides students an overview of the fields of civil engineering and architecture, while providing exploration into the areas of interior design and construction. This course provides the students with a combination of instrument drafting skills and use state of the art software to solve real world problems. This course covers topics such as: the roles of civil engineers and architects; project planning; site planning; building design; utilization of surveying equipment (transits, levels, lasers). A comprehensive portfolio of original, residential home designs are created for those students who are interested in the career fields of civil engineering, architecture and construction.
0853 ARCHITECTURAL MODEL MAKING
Grade: 11, 12  
Exam: local  
Reading Level: various
Prerequisites: Technical Drawing, Civil Engineering & Architecture & grade level requirement.
Architectural Model Making is designed for the advanced student who is interested in architectural drawing and design and is considering post high school study in building construction, architecture or architectural drawing or has a high vocational or a vocational interest in the subject. Students will individually draw and construct scale structural models, a scale presentation drawing, and an extensive model designed and constructed as a group.

0864 DRAWING & DESIGN FOR PRODUCTION (DDP)
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various
Prerequisites: none
This is the first in a series of STEM courses for students interested in engineering and is tailored to a student wanting to design, test, and fabricate group and independent projects they have sketched and drawn using computer design software. Materials such as wood, metal, ceramics, paper and plastic will be used to construct lab based projects using hand and power tools. Hands-on projects may include air, land and water vehicles, structures, furniture, skateboards, robotics, wind turbines, T-shirt graphics design, and Web page design. Applying creative problem solving and engineering design processes, students will prepare their projects for testing, evaluation, and/or competitions. Students may use DDP for a Tech. Ed. credit and the Art/Music graduation requirement.

0865 PRINCIPLES OF ENGINEERING (POE)
Grade: 11, 12  
Exam: local  
Reading Level: high
Prerequisite: Technical Drawing and CAD are suggested
PRINCIPLES OF ENGINEERING (POE) is a capstone, STEM/engineering course for those students considering engineering at the collegiate level. This year long course is designed to engage students in various fields of engineering. POE students will explore a range of technological systems, manufacturing processes, and how engineers/technicians use math, science and technology in engineering as a problem-solving tool. Activities that provide the foundation of POE include: study of mechanisms, energy, electrical/fluid systems; exploration of material science, quality control, model making, testing and robotics. The course also includes concerns about social and political consequences of technological change.
Communications Courses

0700 MEDIA PRODUCTIONS
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various  
Prerequisite: none  
This full year, hands-on course allows students to create a digital yearbook that reflects their experiences during their secondary education and to produce video and audio productions. We will be working with video cameras, audio equipment, editing equipment as well as studying the marketing and advertising aspect of media productions. Students will work on Macintosh computers and a variety of software including Final Cut Express Adobe Premiere and After Effects for video editing and Pro Tools for audio editing. This will allow students to integrate sound and video within their video productions. This course qualifies students to become a member of QTV morning announcements.

0830 PHOTOGRAPHY I
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various  
Prerequisite: none  
Photography is an introductory technology elective for students who wish to explore the use of the camera both as a documentary and creative tool of the artist. Course emphasis will include: understanding the camera, the history of photography, lenses, digital printmaking, introduction to digital photography, Adobe Photoshop software, matting and presentation of the photograph. The course will be divided between photo assignments and lab work. A camera is required for the course.

0831 PHOTOGRAPHY II
Grade: 9, 10, 11, 12  
Exam: local  
Reading Level: various  
Prerequisite: Photography I  
Photography II will introduce the student to advanced techniques and processes used in digital photography, along with emphasis placed on creative expression by the student through application and investigation. A camera is required for the course. A Digital Single Lens Reflex camera is recommended.
0832 DIGITAL IMAGERY/PHOTOSHOP
Grade: 9, 10, 11, 12  20 weeks/5 meetings per week – ½ unit
Exam: local  Offering: by semester
Reading Level: various  May earn college credit (see pg. 83)
**Prerequisite:** none
This course deals with the creation and application of digital imagery and photography. Students will be taught how to edit, enhance, combine and manipulate images captured from digital cameras. Students will use digital cameras, computers, scanners, printers and Adobe Suite software as they learn how to produce digitally based visual images. Emphasis will be placed on how to plan and produce digital photographic compositions that demonstrate an understanding of light, design, color, visual impact and the use of technology in this rapidly expanding field.

0840 COMMUNICATIONS SYSTEMS
Grade: 9, 10, 11, 12  20 weeks/5 meetings per week – ½ unit
Exam: local  Offering: by semester
Reading Level: various  May be used for ½ unit Art/Music
**Prerequisite:** none
Communication Systems is an exciting course that allows the students to learn about Final Cut Express video editing software and the Macintosh computer environment. Students in this class will make a variety of videos. Students will learn how to create a “green screen” color key in the style of “Who’s Line is it Anyway”, craft a parody in the style of “Saturday Night Live”, turn 100 photos into a picture project with music, create a music video like those on TV as well as other fun projects. This course qualifies students to become a member of QTV morning announcements.

**NOTE:** This course can be combined with COMPUTER APPLICATIONS (0841). This course will then be a one credit, full year course with the emphasis on the Macintosh Computer and Desktop Publishing. This combined course will fulfill ½ credit for Art/Music AND ½ credit for Computer Requirement.

0842 COMMUNICATION SYSTEMS/COMPUTER APPLICATIONS
Grade: 9, 10, 11, 12  40 weeks/5 meetings per week – 1 unit
Exam: Local  Offering: year long
Reading Level: various  May be used for ½ unit Art/Music and Computer
**Prerequisite:** None
This course combines Communication Systems (0840) and Computer Applications (0841) to form a full year 1 credit course. This combination allows us to have more time so that we can explore more areas relative to the computer and its software, video productions, audio productions, planning and editing. This course qualifies students to become a member of QTV morning announcements.
0820 BASIC AUTO MAINTENANCE
Grade: 10,11,12 20 weeks/5 meetings per week - ½ unit
Exam: local Offering: by semester
Reading Level: various
**Prerequisite:** none
This course is designed primarily for the student who has very little or no experience or knowledge of the basic functions and maintenance of automobiles. Everyday simple items such as proper tire care and service, wipers, headlights, bulbs, fluid checks, car care, interior and exterior detailing and many more common day-to-day maintenance problems will be covered in this hands-on program.

0821 SMALL ENGINE TECHNOLOGY
Grade: 9, 10, 11, 12 20 weeks/5 meetings per week - ½ unit
Exam: local Offering: by semester
Reading Level: various
**Prerequisite:** none
Small Engine Technology will allow students to work on a basic lawn mower engine. Through hands-on activities in class, students will get a first-hand view of the working parts both outside and inside their lawn mower engine. This course requires students to bring in a 4-cycle lawn mower engine (no larger than 7 horsepower) to work on in class.

0825 ENERGY
Grades: 9, 10, 11, 12 20 weeks/5 meetings per week - ½ unit
Exam: local Offering: by semester
Reading Level: various
**Prerequisite:** none
This course will give the students a basic overview of the development and applications of various renewable and non-renewable types of energy. Students will complete hands-on activities through a series of problem solving labs. Projects may include building a hydraulic robot, solar model, hydrogen fuel cells, conventional and alternative energy sources and models in the area of air and propeller powered vehicles.
**Computer Courses**

**0841 COMPUTER APPLICATIONS**

<table>
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<th>Grades: 9, 10, 11, 12</th>
<th>20 weeks/5 meetings per week – ½ unit</th>
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<tbody>
<tr>
<td>Exam: local</td>
<td>Offering: by semester</td>
</tr>
<tr>
<td>Reading Level: various</td>
<td>Required for a 5 unit combination</td>
</tr>
</tbody>
</table>

**Prerequisites:** none

The development of computers and computer hardware is discussed but the main emphasis will be using software packages such as Microsoft Office, Adobe Illustrator, and Photoshop to create a variety of computer-generated experiences for each student.

**NOTE:** This course can be combined with COMMUNICATIONS SYSTEMS (0840). This will then be a one credit, full year course with emphasis on the Macintosh Computer. This course will fulfill the ½ credit for Computer requirement.

**0843 ENTREPRENEURSHIP IN GRAPHIC COMMUNICATIONS**

<table>
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<th>Grade: 9, 10, 11, 12</th>
<th>40 weeks/5 meetings per week – 1 unit</th>
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<tbody>
<tr>
<td>Exam: local</td>
<td>Offering: year long</td>
</tr>
<tr>
<td>Reading Level: various</td>
<td>May be used for ½ unit Art/Music</td>
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</tbody>
</table>

**Prerequisite:** none

Entrepreneurship in Graphic Communication introduces the process of the printing and publishing industry. This course is influenced by a highly computerized field that uses sophisticated computer programs such as Adobe Photoshop, Adobe Illustrator, Roland Versaworks, along with the use of a state of the art Vinyl/Cutter printer. The course consists of modules, where students design and create media such as decals, logos, banners, signage, and posters, as the end product of a student run business. This year long course emphasizes the personal, business, and economic system focusing on design and innovation. Hands-on learning accounts for 75% of the instructional time with many of the projects revolving around the graphic design industry. The other 25% of instructional time is dedicated to learning programs and building a successful business model. Career opportunities will also be explored in the graphic communications field.
OPCSD STEM Education

STEM in the Orchard Park Central School District consists of a conglomeration of classes relevant to Science, Technology, Engineering and Mathematics (STEM). This may start with the advanced OPMS Technology Education students, or in other grade levels at OPHS and continues throughout their high school career. The STEM curriculum is a collaborative effort created by the Science, Technology Education, and Mathematics departments, and is supported by practicing professionals in the field. Courses in these subject areas have been designed specifically in order to advance the study of engineering. Students, who choose this course of study as part of their comprehensive high school education, will explore various careers in engineering allowing them to distinguish a specific career path after high school. This is not a tracked program; rather, the goal of this program is to prepare students for entry into a two-year, four-year, or five-year college engineering program.

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<th>TECHNOLOGY EDUCATION</th>
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<tr>
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<tr>
<td>9</td>
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<td>Drawing &amp; Design for Production Computer Application Communication Systems</td>
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<td>10</td>
<td>Algebra 2/Trigonometry Programming</td>
<td>Chemistry – R</td>
<td>CAD Graphic Communications Constructions Tech Energy</td>
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