

Engineering & Technology High School

The Following Courses will be offered for the High School program under Engineering & Technology for the year 2013 & 14 year.

These courses are the First Phase for the development of new Pathways, Courses, Assessments and Lead Codes for the Engineering Program and will offered during the 2013-14 year. Further development of Pathways/Clusters will allow these and other courses to be selected relating to the New Engineering Career Pathways.

Course Number	Course Title	Course Description	Low Grade	High Grade	Credits	Population	Content
210107	Foundations of Technology (ITEEA)	<p>This course provides the “foundation” for students to understand and apply technological concepts and processes that are the cornerstone for the high school technology program. Group and individual activities engage students in creating ideas, developing innovations, and engineering practical solutions. Technology content, resources, and laboratory activities encourage student applications of Kentucky Core Content. This course will focus on the three dimensions of technological literacy: 1) knowledge, 2) ways of thinking and acting, and 3) technological capabilities. The goal being that students develop the characteristics of a technologically literate citizen. The course will employ teaching/learning strategies that enable students to build their understanding of new ideas. It is designed to engage students in exploring and deepening their understanding of “big ideas” regarding technology. This can be accomplished through modular or other instructional strategies. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration.</i></p>	9	10	1	General	Engineering & Technology Education
210108	Technological Design (ITEEA)	<p>This course contributes to the development of each high school student’s capability to understand how technology’s development, control, and use are based on design constraints and human wants and needs. The structure of the course challenges students to use technological design processes so that they can think, plan, design, and create solutions to engineering and technological problems. Students are actively involved in the organized and integrated application of technological resources, engineering concepts, and scientific procedures. Students address</p>	9	11	1	General	Engineering & Technology

		<p>the complexities of technology that stem from designing, developing, using, and assessing technological systems. The goals of this course can be accomplished through various laboratory instructional strategies utilizing the seven contexts of technological literacy. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration.</i></p>					
210109	Technological Issues & Impacts (ITEEA)	<p>This course addresses the positive and negative impacts of technology and the intended and unintended results of its implementation. Students investigate and analyze critical historical and emerging issues affecting the creation, development, use and control of contemporary and future technology. Laboratory activities will allow students to propose and implement alternative solutions. Students will measure, quantify, assess, and communicate the impacts of these proposals and the issues that accompany them. The goals of this course can be accomplished through various classroom and laboratory instructional strategies. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration..</i></p>	10	12	1	General	Engineering & Technology Education
210110	Engineering Design (ITEEA)	<p>Engineering scope, content, and professional practices are presented through practical applications in this capstone course. Students in engineering teams apply technology and Kentucky Core Content and skills to solve engineering design problems and create innovative designs. Students research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors and ethics. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration.</i></p>	-	12	1	General	Engineering & Technology
210111	Special Problems In Technology	<p>This independent-study course is designed to allow a High School student to study in-depth a technology topic or issue. The experience will enable the student to gain a more comprehensive knowledge of a particular technological context. A variety of instructional strategies using multiple resources, specialized laboratories, and collaboration with mentoring experts should be encouraged. Independent studies and/or internships could be utilized. Instruction should be enhanced through participation in Kentucky Technology Student</p>	9	11	1-4*	General	Engineering & Technology

		Association challenges. <i>This course may be 18 to 36 weeks in duration.</i>					
210112	Special Technology Topics	Special Technology Topics allows the teacher to develop a course for in-depth exploration of technological topics. This is a laboratory-based course designed to study a technological system or topic, and/or a recent technological advancement. This study should include how this advancement affects society and/or the environment. A culminating project integrating one or more of the seven contexts of technological literacy and the Kentucky Core Content is encouraged. It should include research, design, construction, analysis, writing, and presenting. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. <i>This course may be 18 to 36 weeks in duration.</i>	9	11	1-4*	General	Engineering & Technology Education
210116	Foundations of Energy	Foundations of Energy is a course in career and technical education for secondary students. The course provides an overview of renewable and nonrenewable energy resources reflecting how energy impacts the environment and the economy from regional, state, national and global perspectives. Extensive hands-on laboratory activities are vital components of the curriculum. This course can provide a basis for students working toward various career pathways in energy such as Engineering/Technology, Construction and Manufacturing Technology. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. <i>This course may be 18 to 36 weeks in duration.</i>	9	11	1	General	Engineering & Technology Education
210117	Advanced Design Application (ITEEA)	This course consists of the first four units of the ProBase curriculum. These units are: Manufacturing, Energy and Power, Construction and Transportation. The Manufacturing unit examines the advance that maintain manufacturing efficiency, how human consumption affects manufacturing, how manufacturing affects the standard of living of various peoples, and how processing and changing raw materials can produce more desirable products. The Construction unit examines a number of the factors influencing the design and construction of permanent and semi-permanent structures. The practice related to construction maintenance, alterations, and renovation, and the functions of the primary systems installed in those structures. The Energy and Power unit explores the relationship	-	12	1	General	Engineering & Technology Education

		<p>between energy and power technologies and all other technologies and how modern energy and power system impact cultures, societies and the environment. It also offers an examination of how energy and power systems can be made more efficient and how they may be utilized in problem solving. The Transportation unit examines the complex networks of interconnected subsystems that each transportation system comprises and the roles of these components in the overall functional process of the system. It also analyzes the improvements and the impacts of transportation technologies on the environment, society, and culture. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. Each of the four units is approximately 9 weeks in length. If the course is scheduled for 18 weeks, only 2 units can be completed. Completion of all four units requires a 36-week course.</p>					
210118	Advanced Technological Applications (ITEEA)	<p>This course consists of the remaining four units of the ProBase curriculum. These units are: Information Technology, Agriculture and Bio-related Technologies, Medical, and Entertainment/Recreation Technology. The Information Technologies unit examines how technology facilitates the gathering, manipulation, storage, and transmission of data, and how this data can be used to create useful products. It also provides students with opportunities for developing communication systems that can solve technological problems. The Agriculture and Bio-related Technologies unit explores how agricultural technologies provide increased crop yields and allow adaptation to changing and harsh environments, enabling the growth of plants and animals for various uses. It also offers an analysis of the various uses of biotechnology and the ethical considerations of those uses. The Medical Technologies unit provides an analysis of how medical technologies are used to increase the quality and length of human life, and require public debate. Students will also examine tools and devices used to repair and replace organs, prevent disease, and rehabilitate the human body. The Entertainment/Recreation unit provides a study of technological entertainment and recreation systems, with an examination of the differences between these technologies, of how their use enhances human leisure-time performance and of the</p>	-	12	1	General	Engineering & Technology Education

		social, cultural, and environmental implications of their usage. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. Each of the four units is approximately 9 weeks in length. If the course is scheduled for 18 weeks, only 2 units can be completed. Completion of all four units requires a 36-week course.					
210133	Graphic Communication Technology	This is a fundamental course that offers a cross-disciplinary program designed for students interested in gaining knowledge and skills in various phases of graphic communication technology. This is a project based program with activities in, but not limited to, computer design, digital imaging, document layout, multimedia, web site development, digital printing, offset printing, screen and sublimation printing processes, bindery, packaging technology. Students apply creative problem solving while learning about technology and management practices related to the production and distribution of graphic media in its many forms. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. <i>This course may be 18 to 36 weeks in duration</i>	9	12	1	General	Engineering & Technology Education
ENGINEERING TECHNOLOGY NON-PLTW							
210221	Fundamentals of Engineering Design I	Introduction to Computer Aided Drafting and Engineering Design Principles. This course continues to apply the skills, concepts, and principles of engineering. Students explore various technological systems and engineering processes in related career fields. Topics include investigating technological system, design optimization, and problem solving. Students utilize CAD and physical and virtual modeling concepts to construct, test, collect, and report data. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. <i>This course may be 18 to 36 weeks in duration</i>	9	10	1	General	Engineering & Technology Education

210222	Engineering Design II	<p>A project and research based Computer Aided Drafting and Design course that extends the learning experiences where students focus on mechanical, electrical, fluid and thermal systems allowing in depth exploration in selected disciplines of engineering areas such as manufacturing, power/energy/transportation, bio-medical, robotics, hydraulics, electricity/electronics, communications, construction systems, alternative energy and computer aided design and problem solving. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	10	12	1	General	Engineering & Technology Education
210223	Fundamentals of Architectural and Civil Engineering	<p>This is an introduction to residential and light commercial building construction and design. Students will learn basic sketching, mechanical drafting skills with an emphasis on computer aided drafting. In this class, students will design a structure relevant to today's modern architecture and create models of their designs with various materials and tools. Students will experience and solve many problems in designing or building structures with regards to environment and community impact and limitations from town planning, urban design and landscape architecture to furniture and objects. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	9	12	1	General	Engineering & Technology Education
210224	Principles of Engineering and Technology	<p>This is a fundamental course that provides a project based learning approach to understanding the principles and concepts of physics and associated mathematics for most Engineering Technology programs. Students explore various careers and disciplines of engineering areas, problem solving and core technology such as, but not limited to; manufacturing, power/energy/transportation, robotics, hydraulics, electricity/electronics, communications, construction systems, alternative energy and computer aided design. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	9	10	1	General	Engineering & Technology Education

210225	Introduction to Manufacturing & Manufacturing Systems	<p>This is a comprehensive course designed for the study of general concepts and principles of Manufacturing and Manufacturing systems. This course provides for hands-on learning experience which enhances the understanding of various metallic and nonmetallic materials, processes, and products. Materials studied may include polymers, ceramics, woods, composites, and metal materials associated with manufacturing. Students will use basic tools, equipment and operations of manufacturing industries. Students have the opportunity to engage in product design, prototyping, computer-assisted manufacturing applications, CNC machines, robotics, and production management. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	9	12	1	General	Engineering & Technology Education
210226	Fundamentals of Aeronautical & Aerospace	<p>This course is an introduction to Aeronautical and Aerospace Engineering and Technology. Students will discover the principles of basics aerodynamics of various forms of aircraft and spacecraft. Integrating math, science and engineering principles students will learn the fundamentals elements of aerodynamics through experimentation of airfoils and wings, aircraft performance, stability and control, propulsion, and structures leading toward the aircraft conceptual design. With the use of computer aided software students will design, build and test various aeronautical structures and/or aircraft. The course includes historical research in aviation and aerospace history, development, modern technology, and explores careers in industry, military and aeronautical engineering.</p>	9	10	1	General	Engineering & Technology Education
210229	Aeronautical & Aerospace Engineering Design and Testing	<p>This course further extends knowledge and skills of aerospace engineering topics such as aerodynamics, aerospace structures, flight mechanics, dynamics and control of surfaces, orbital mechanics, aerospace structures and materials, aerospace systems and propulsion. Students will design, build and test aeronautical components, structures and vehicles through laboratory activities and use of computer aided software while developing an in-depth knowledge of aerospace engineering and career opportunities. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	10	12	1	General	Engineering & Technology Education

210230	Fundamentals of Mechatronics	<p>Electro-Mechanical Systems courses provide students with instruction and experience with mechanical devices, actuators, sensors, electronics, intelligent controllers and computers. Students gain an understanding of the principles of electricity and mechanics and their application to gears, including hydraulic/pneumatic equipment, cams, levers, circuits, and other devices used in the manufacturing process or within manufactured goods. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	11	12	1	General	Engineering & Technology Education
210231	Introduction to Mining Engineering and Technology	<p>This course introduces students to the careers and basic engineering principles of various forms of mining and systems. Students will learn understand the challenges of future technologies as it relates to safety and environmental impact. Student will be able to apply engineering designing process as part of modern strategic mine planning. Students will be able to identify the importance for mine regulations, safety, proper management, required training, certifications and health risks. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	9	12	1	General	Engineering & Technology Education
210232	Electricity and Electronics Fundamentals	<p>In this course students will gain skills and knowledge through classroom and lab activities in the areas of basic DC and AC circuits, circuit components, codes, testing, electromagnetism and inductance, capacitance, power supplies, power generation and distribution, amplification, digital circuits, and computer fundamentals. Students will learn the safe use of the tools, test instruments, equipment and supplies used in this course plus information on career opportunities in this field. Hands-on and problem solving activities will expose students to areas of electron theory, Ohm's Law, insulators, conductors, electronic components, oscillators, radio transmission and reception, telephone communications, audio system, television transmission and reception, microcomputers, and electronic fabrication. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p> <p><i>This course may be 18 to 36 weeks in duration</i></p>	9	12	1	General	Engineering & Technology Education

210290	Special Topics in Engineering	Special Topics in Engineering allows the teacher to develop a course for in-depth exploration of specific engineering topics. This is a laboratory-based course design to study an engineering challenge, and/or recent technological advancements such as alternative energy, transportation, or other energy related fields. This study should include how this advancement affects society and/or environment. A culminating project integrating one or more of the contexts of the field of engineering and the Kentucky Core Content is encouraged. It should include research, design, construction, analysis, writing, and presenting. Instruction should be enriched through participation in Kentucky Technology Student Association or other engineering-related organization. This may be 18 to 36 weeks in duration.	9	12	1-4*	General	Engineering & Technology Education
210316	Leadership Dynamics Engineering & Technology	This course is designed to assist students with developing skills needed to be successful leaders and responsible members of society. The student will develop personal attributes and social skills. Emphasis will be placed on interpersonal skills, team building communication, personal development and leadership. This course will include opportunities for students to apply their knowledge. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.	9	12	.5-1	General	Engineering & Technology Education
210330	Engineering & Technology Co-Op	Cooperative Education for CTE courses indicated within the KY Department of Education provides supervised work site experience related to the student's ILP. Students who participate receive a salary for these experiences, in accordance with local, state and federal minimum wage requirements. Content: Engineering and Technology	11	12	1-3	General	Engineering & Technology Education

		PLTW HIGH SCHOOL PROGRAM						
219901	Introduction to Engineering Design (PLTW 1 of 3 Required Courses)	This course provides instruction and experiences that develop foundational skills in engineering processes. Students gain skills in problem-solving by using a design development process. Models of product solutions are created, analyzed, and communicated using solid modeling computer design software. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. This course may be 18 or 36 weeks in duration.	9	12	1	General	Engineering & Technology Education	
219902	Principles of Engineering (PLTW 1 of 3 Required Courses)	This course promotes a conceptual understanding of the engineering/engineering technology field. Exploring various technology systems and manufacturing processes help students learn how engineers and technicians use math, science and technology in an engineering problem solving process to benefit people. The course also addresses concerns about social and political consequences of technological change. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges. This course may be 18 or 36 weeks in duration.	9	12	1	General	Engineering & Technology Education	
219903	Digital Electronics (PLTW 1 of 3 Required Courses)	This is a course in applied logic that encompasses the application of electronic circuits and devices. Students will become knowledgeable of electrical theory and be able to apply mathematical formulas to calculate circuit performance. Computer simulation software is used to design and test digital circuitry prior to the actual construction of circuits and devices. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.	10	12	1	General	Engineering & Technology Education	
219904	Computer Integrated Manufacturing (PLTW)	This course builds on computer solid modeling skills developed in the Introduction to Engineering Design Course. Students use CAD software to design and develop a product and use CNC equipment to produce a mock-up or prototype. Fundamental concepts of computer integrated manufacturing (CIM) such as concurrent engineering, robotics, and cellular manufacturing are applied during the product development process.	11	12	1	General	Engineering & Technology Education	

219905	Civil Engineering & Architecture (PLTW)	<p>This course provides an overview of the fields of Civil Engineering and Architecture, while emphasizing the interrelationship and dependence of both fields on each other. Students use state-of-the-art software to solve real-world problems and communicate solutions to hands-on projects and activities. This course covers topics such as:</p> <ul style="list-style-type: none"> o The Roles of Civil Engineers and Architects o Project Planning o Site Planning o Building Design o Project Documentation and Presentation <p>Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p>	11	12	1	General	Engineering & Technology Education
219906	Engineering Design & Development (PLTW)	<p>This is a capstone course that culminates and applies concepts learned in previous PLTW courses. In this course, students work in teams to research, design, and construct a solution to an open-ended engineering problem. Students are guided by an engineer mentor. They must present progress reports, submit a final written report, and defend their solutions to a panel of outside reviewers at the end of the course. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p>	-	12	1	General	Engineering & Technology Education
219907	Aerospace Engineering (PLTW)	<p>In this course, students conduct hands-on engineering projects developed through collaboration with NASA. Concepts of aerodynamics, astronautics, space-life sciences, and systems engineering are experienced. Intelligent vehicles such as the Mars rovers - Spirit[®] and - Opportunity[®] provide real-life applications of modern space exploration technology. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p>	11	12	1	General	Engineering & Technology Education
219908	Biotechnical Engineering (PLTW)	<p>This course addresses relevant concepts from the diverse fields of bio-technology, bio-engineering, bio-medical engineering, and bio-molecular engineering. Students will apply and concurrently develop secondary-level knowledge and skills in biology, physics, technology, and mathematics through project-based instruction. Instruction should be enhanced through participation in Kentucky Technology Student Association challenges.</p>	11	12	1	General	Engineering & Technology Education

<p>219917</p>	<p>Special Topics in Engineering</p>	<p>Special Topics in Engineering allows the teacher to develop a course for in-depth exploration of specific engineering topics. This is a laboratory-based course design to study an engineering challenge, and/or recent technological advancements such as alternative energy, transportation, or other energy related fields. This study should include how this advancement affects society and/or environment. A culminating project integrating one or more of the contexts of the field of engineering and the Kentucky Core Content is encouraged. It should include research, design, construction, analysis, writing, and presenting. Instruction should be enriched through participation in Kentucky Technology Student Association or other engineering-related organization. This may be 18 to 36 weeks in duration.</p>	<p>9</p>	<p>12</p>	<p>1-4*</p>	<p>General</p>	<p>Engineering & Technology Education</p>
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