

## HIGH SCHOOL TECHNOLOGY & ENGINEERING EDUCATION COURSE CODES GRADES 9-12

*High school (grades 9-12) courses in Technology Education **require 150 contact hours** per Career and Technical Education (CTE) credit.*

Course Code	Course Name	Recommended Grade Levels	Description	High School Credit Options*	License/credential Required**
10091	Individual Technical Problems	11-12	To provide a course for schools who cannot offer other specified course titles. Experiences in communication technology, production technology, and energy utilization are to be identified and developed on a contractual basis by the student and approved by the instructor.	½ or 1 <i>Max credit = 1</i>	License Code: 10005-Industrial Arts ♦ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ♦ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ♦ 5-12 or 9-12
10093	Applying Technology	9-12	This is an activity-based course addressing all 20 of the Standards for Technological Literacy using primarily a modular classroom environment.	½ or 1 <i>Max credit = 2</i>	
10094	Foundations of Technology	9-12	Foundations of Technology increases student's capability by using their unique skills to innovate, improvise, and invent. Students develop an understanding of engineering design, transforming ideas into products or systems. They select and use manufacturing, construction and energy and power technologies in order to understand quality goods, impact of structures and the importance of energy resources. Students also gain insights into the use of communication technologies, telemedicine and other medical technologies. The course concludes with the synthesizing of major ideas through an understanding of the impacts the use of technology has on society and the environment. A state recommended course guide is available.	½ or 1 <i>Max credit = 1</i>	
10096	Technology and Society	9-12	Technology and Society teaches students critical thinking skills as they relate to the creation and use of technology. Students are prepared to analyze issues, consider their validity, formulate positions, and defend these positions. This course helps students disentangle the elements of an issue, allowing them to make informed decisions. It prepares all students, whether they intend to be engineers, cosmetologists, or parents, to make informed decisions about their individual, community, and organizational uses of technology. A state recommended course guide is available.	½ or 1 <i>Max credit = 1</i>	

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10111	Construction Technology	9-12	To study the technology involved in the construction of residential and industrial structures. Study will include designing, planning, and constructing structures using various materials and methods.	½ or 1 <i>Max credit = 2</i>	License Code: 10005-Industrial Arts ♦ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ♦ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ♦ 5-12 or 9-12
10121	Manufacturing Technology	9-12	To provide students with a broad overview of the technology involved in creation and production of consumer products. Study will involve techniques and processes used to produce goods including manufacturing systems, materials, planning, financing, and distribution	½ or 1 <i>Max credit = 1</i>	
10251	Communication Technology	9-12	This is an activity-based course that provides the application of tools, materials and energy in developing, processing, using and assessing communication systems. Students will produce graphic and electronic media as they explore techniques used to apply technology communicating information and ideas.	½ or 1 <i>Max credit = 1</i>	
10259	Design/Drafting	9-12	An evolving study of modern drafting within the framework of communication technology. The course provides an experience in design and drafting as it applies in an industrial environment.	½ or 1 <i>Max credit = 1</i>	
10260	3D Modeling and Design	9-12	Students will explore systems of design, construction and testing. Using CAD software, students will gain technical skills in product design, prototyping, and the design process.	½ or 1 <i>Max credit = 1</i>	
10331	Energy and Transportation Technology	9-12	This is an activity-based course that introduces students to generation, conversion, control, transmission and storage of energy. Machines and tools are used to increase strength and mechanical advantage in the movement of people and materials. Energy and transportation is equally applied to production, communication and transportation activities introduce major scientific and mathematical concepts that support energy and transportation.	½ or 1 <i>Max credit = 1</i>	

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10338	Advanced Design Applications	9-12	This is a standards-based, engineering-related course providing an engineering or technical base for students. It consists of four separate learning units, each nine weeks in length: Manufacturing Technologies, Energy and Power Technologies, Construction Technologies and Transportation Technologies. Each unit has a primary challenge or design problem that is supported in separate learning cycles. The course allows students to focus on solutions to problems, with minimal constraints. A state recommended course guide is available.	½ or 1  <i>Max credit = 1</i>	License Code: 10005-Industrial Arts ♦ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ♦ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ♦ 5-12 or 9-12
10339	Advanced Technological Applications	9-12	This is a standards-based, engineering-related course providing an engineering or technical base for students. It consists of four separate learning units, each nine weeks in length: Information and Communication Technologies, Medical Technologies, Agriculture and Related Biotechnologies and Entertainment and Recreation Technologies. Each unit has a primary challenge or design problem that is supported in separate learning cycles. The course allows students to focus on solutions to problems, with minimal constraints. A state recommended course guide is available.	½ or 1  <i>Max credit = 1</i>	
10410	Technological Design	9-12	In Technological Design, engineering scope, content, and professional practices are presented through practical applications. Students in engineering teams apply technology, science, and mathematics concepts and skills to solve engineering design problems and innovate designs. Students research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors, and ethics. This course is an essential experience for students who are interested in technology, innovation, design, and engineering. A state recommended course guide is available.	½ or 1  <i>Max credit = 1</i>	
10411	Robotics Engineering	9-12	Robotics Engineering provides a comprehensive study of engineering concepts including physics, programming, mechanical systems, electrical and electronics systems. These core concepts are delivered with a robotics emphasis through relevant activities and projects.	½ or 1  <i>Max credit = 1</i>	

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10415	Engineering Design	11-12	The Engineering Design course is the capstone course focusing on how engineers apply their creativity, resourcefulness, mathematical, scientific and technical knowledge and skills in the creation or refinement of technological products/systems. Students will be challenged to participate as members of engineering teams within a typical business organization. Independent and group work will be reflective of authentic engineering projects found in the designed world. Students will prepare for the technological world in order to assume their roles as informed voters, productive workers, and wise consumers. A state recommended course guide is available.	½ or 1  <i>Max credit = 1</i>	License Code: 10005-Industrial Arts ◆ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ◆ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ◆ 5-12 or 9-12
10510	Invention and Innovation	9-12	Invention and Innovation prepares students with opportunities to apply the design process in the invention or innovation of a new product, process, or system. Students learn about the core concepts of technology and about the various approaches to solving problems, including engineering design and experimentation. Students apply their creativity in the invention and innovation of new products, processes, or systems. Students participate in engineering-design activities where they learn about brainstorming, visualizing, modeling, construction, testing, experimenting, and refining designs. Students also develop skills in researching for information, communicating design information, and reporting results. A state recommended course guide is available.	½ or 1  <i>Max credit = 1</i>	
10511	PLTW Introduction to Engineering Design	9-12	This course emphasizes the development of a design. Students use 3-D computer software to produce, analyze and evaluate models of project solutions. They study the design concepts of form and function, and then use state-of-the-art technology to translate conceptual designs into reproducible products. This is a PLTW course and only instructors with this training may use this number and description.	½ or 1  <i>Max credit = 1</i>	License Code: 10511-Project LEAD the WAY Endorsement (Intro to Eng Design) ◆ 5-12
10512	PLTW Digital Electronics	9-12	This course provides students with the applied logic that encompasses application of electrical circuits and devises. Students will use state-of-the-art technology, including computer software and equipment used by industry. Hands-on activities that utilize the team approach to learning how to solve real-world problems while reinforcing the study of math and science. This is a PLTW course and only instructors with this training may use this number and description.	½ or 1  <i>Max credit = 1</i>	License Code: 10512-Project LEAD the WAY Endorsement (Digital Electronics) ◆ 5-12

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10513	PLTW Principals of Engineering	9-12	This course provides students with an opportunity to investigate engineering and high-tech careers and to develop skills and understanding of course concepts. Students employ engineering and scientific concepts in the solution of engineering design problems, develop problem-solving skills, and apply their knowledge of research and design to create solutions to various challenges. This is a PLTW course and only instructors with this training may use this number and description.	½ or 1  <i>Max credit = 1</i>	License Code: 10513-Project LEAD the WAY Endorsement (Principles of Engineering) ♦ 5-12
10514	PLTW Civil Engineering & Architecture	9-12	This course provides students with opportunities to work in teams, exploring hands-on activities and projects to learn the characteristics of civil engineering and architecture. In addition, students use 3D design software to help them design solutions to solve major course projects. Students learn about documenting their project, solving problems, and communicating their solutions to their peers and members of the professional community of civil engineering and architecture. This is a PLTW course and only instructors with this training may use this number and description.	½ or 1  <i>Max credit = 1</i>	License Code: 10514-Project LEAD the WAY Endorsement (Civil Engineering & Architecture) ♦ 5-12
10515	Technological Systems	9-12	Technological Systems is designed to introduce students to systems and processes to develop an understanding of the impact of technology on humans, the environment, and the global community. It is intended to teach students to learn how systems work together to solve problems and capture opportunities. By investigating systems through their function, design, and development, students will understand what systems are, why they are developed and how 'systems thinking' can be used to describe them. Students engage in activities and experiences where they evaluate the impacts of technology through the lenses of culture, society, economics and the environment. A state recommended course guide is available.	½ or 1  <i>Max credit = 1</i>	License Code: 10005-Industrial Arts ♦ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ♦ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ♦ 5-12 or 9-12
10517	PLTW Computer Integrated Manufacturing	9-12	The major focus of this course is to answer questions such as: How are things made?  What processes go into creating products? As students find the answers to these questions, they learn about the history of manufacturing, a sampling of manufacturing processes, robotics, and automation. The course is built around several key concepts: computer modeling, Computer Numeric Control (CNC) equipment, Computer Aided Manufacturing (CAM) software, robotics and flexible manufacturing systems. This is a PLTW course and only instructors with this training may use this number and description.	½ or 1  <i>Max credit = 1</i>	License Code: 10517-Project LEAD the WAY Endorsement (Computer Integrated Manufacturing) ♦ 5-12

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10518	PLTW Environmental Sustainability	9-12	Students investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply, and renewable energy.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only.</b>	½ or 1  <i>Max credit = 1</i>	License Code: 10518-Project LEAD the WAY Endorsement (Environmental Sustainability) ◆ 5-12
10519	PLTW Engineering Design & Development	11-12	This is a capstone course that provides students with the ability to identify an issue and then research, design, and test a solution; ultimately presenting their solution to a panel of engineers. Students apply the professional skills they are developing to document their design process.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only.</b>	½ or 1  <i>Max credit = 1</i>	License Code: 10519-Project LEAD the WAY Endorsement (Engineering Design & Development) ◆ 5-12
10520	PLTW Engineering Essentials	9-12	This introductory course will give students the foundational concepts of engineering practice insight into engineering careers and opportunities to solve real-world problems.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only.</b>	½ or 1  <i>Max credit = 1</i>	License Code: 10520-Project LEAD the WAY Endorsement (Engineering Essentials) ◆ 5-12
10610	STEM Seminar (Tech Ed)	9-12	STEM Seminar provides students with a project based and integrated and holistic experience with Science Technology Engineering and Math. Taught by an interdisciplinary team of teachers, the course demonstrates the blurring of content areas when solving an authentic problem. It focuses on engaging students in hands on interdisciplinary application of the Engineering Design Process. Students engage in authentic projects and create products, presentations, and network with local STEM industry experts. In this course students uncover and acquire a cohesive set of concepts, competencies, and dispositions of science, technology, engineering, and mathematics that they transfer and apply in both academic and real-world contexts in order to be globally competitive in the 21 <sup>st</sup> Century. This course curriculum infuses academic content from Math, Science, Language Arts, and Social Studies. It utilizes state standards, technical skills and develops 21 <sup>st</sup> Century Skills such as communication, networking, collaboration, decision making, creativity and critical thinking.  <b>Note: This course can be taught for Technology &amp; Engineering credit only. For Mathematics credit, use STEM Seminar (Math) under Mathematics. For Science credit, use STEM Seminar (Science) under Science. Only one (1) credit of this course can be used towards the coordinated plan of study for the Academic and Career and Technical Education Scholarship.</b>	½ or 1  <i>Max credit = 2</i>	License Code: 10005-Industrial Arts ◆ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ◆ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ◆ 5-12 or 9-12

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10710	Biomedical Technology	9-12	Biomedical Technology is designed to introduce students to the recent advancements in biotechnology and biomedical engineering. Diverse topics range from cancer treatment utilizing nanomaterials to biomedical devices used in prosthetics and implants. The course will cover the future trends and societal, ethical and environmental implications of these technologies.	½ or 1 credit <i>Max credit = 1</i>	License Code: 10009-Technology and Engineering Education Endorsement ♦ 5-12
10730	PLTW Principles of Biomedical Science	9-12	Students will explore concepts of biology and medicine to determine factors that led to the death of a fictional person. Students will examine autopsy reports, investigate medical history and explore medical treatments that might have prolonged the person's life. Students are introduced to human physiology, basic biology, medicine and research processes while designing their own experiments to solve problems.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only</b>	½ or 1 credit <i>Max credit = 1</i>	License Code: 10730-Project Lead the Way Endorsement (Principles of Biomedical Science) ♦ 5-12
10732	PLTW Human Body Systems	9-12	Students examine the interactions of human body systems as they explore identity, power, movement, protection and homeostasis. Students build organs and tissues on MANIKEN® skeletal models; use data acquisition software to monitor body functions; and take on the roles of biomedical professionals to solve real-world medical cases.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only</b>	½ or 1 credit <i>Max credit = 1</i>	License Code: 10732-Project Lead the Way Endorsement (Human Body Systems) ♦ 5-12
10734	PLTW Medical Interventions	9-12	Students follow the life of a fictitious family as they investigate how to prevent, diagnose and treat disease. Students explore how to detect and fight infection; screen and evaluate the code of human DNA; evaluate cancer treatment options; and prevail when the organs of the body begin to fail. Through cases, students learn about a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices and diagnostics.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only</b>	½ or 1 credit <i>Max credit = 1</i>	License Code: 10734-Project Lead the Way Endorsement (Medical Interventions) ♦ 5-12
10810	PLTW Computer Science Essentials	9-12	Students will explore a diverse set of computational thinking concepts, fundamentals and tools. Students use visual, block-based programming and seamless transition to text-based programming to create apps and websites. They apply computational thinking practices and collaborate to create products and address topics and problems important to them.  <b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only.</b>	½ or 1 credit <i>Max credit = 1</i>	License Code: 10810-Project LEAD the WAY Endorsement (Computer Science Essentials) ♦ 5-12

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10815	PLTW Computer Science Principles	10-12	<p>Students will explore computation thinking, generate excitement about career paths that utilize computing and introduce professional tools that foster creativity and collaboration. Students will develop programming expertise and explore the workings of the Internet. Projects and problems include app development, visualization of data, cybersecurity and simulations. This course offering is aligned to the AP Curriculum Framework standard and the AP CSP assessment.</p> <p><b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only.</b></p>	<p>½ or 1 credit</p> <p><i>Max credit = 1</i></p>	<p>License Code: 10815-Project LEAD the WAY Endorsement (Computer Science Principles) ◆ 5-12</p>
10820	PLTW Cybersecurity	9-12	<p>Students will be introduced to the tools and concepts of cybersecurity and be encouraged to create solutions to allow people to share computing resources while protecting privacy. Students solve problems by understanding and closing vulnerabilities. This course raises students' knowledge of and commitment to ethical computing behavior and develops skills as consumers, friends, citizens and employees who move and process information safely.</p> <p><b>NOTE: This course can be taught for Technology &amp; Engineering Education credit only.</b></p>	<p>½ or 1 credit</p> <p><i>Max credit = 1</i></p>	<p>License Code: 10820-Project LEAD the WAY Endorsement (Cybersecurity) ◆ 5-12</p>
10999	Cooperative Work Experience	11-12	<p>Provides students with a regularly scheduled, supervised employment opportunity related to Technology and Engineering Education occupations in order to develop and improve work skills. The employment must be preceded by, or concurrent with, classroom instruction related to the work experience, consistent with the student's occupational goals, and related to the Technology and Engineering Education program area. There shall be a training agreement among all partners to the work experience (school, employer, student, and parents/guardians) outlining the expectations of each party. The instructor shall also develop a specific training plan with the employer for each student placed. The training plan shall include provisions for assessment of student progress and for on-site visits by the instructor during the student's placement.</p> <p><b>NOTE: Students must be at least 16 years old and may be paid a wage by the employer.</b></p>	<p>Maximum of ½ credit per semester, not to exceed 4 credits while in high school</p> <p><i>Max credit = 4</i></p>	<p>License Code: 10005-Industrial Arts ◆ 5-12 or 9-12 <b>OR</b> 10007-Technology Education ◆ 5-12 or 9-12 <b>OR</b> 10010-Industrial Technology ◆ 5-12 or 9-12</p>

\* High school curricular requirements are spelled out in NDCC 15.1-21-02 and High school unit - instructional time is NDCC 15.1-21-03. Maximum credit refers to the maximum units of credit a student may earn for a course over four years of high school. (Example: Band - a student may be enrolled in band all four years of high school -- earning a possible total of four units of credit.)

\*\* Please refer to the second page of the teacher's North Dakota Educator's Professional license to verify which subject areas a teacher is qualified to teach. Licenses and endorsements are obtained on a teaching license from the Education Standards and Practices Board (ESPB).

Credentials are obtained from the Department of Public Instruction (DPI) and are issued to individuals holding a current teaching license.