HIGH SCHOOL INFORMATION TECHNOLOGY COURSE CODES
GRADES 9-12

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

Course Code	Course Name	Recommended Grade Levels	Description	High School Credit Options*	License/credential Required**
27101	Introduction to Information Technology	9-12	An exploratory level course that provides exposure to careers and issues in information technology. Students will develop SCAN skills, including teamwork, communication, entrepreneurship, and personal management. Students will also gain hands-on experience in three major IT areas, including: • Hardware and Software: Safety and tools, numbering systems and basic electricity, operating systems, troubleshooting, etc. • Networking: LAN fundamentals, peer-to-peer networking, IP addressing, troubleshooting, etc. • Programming/Interactive Media: Visual Basic and HTML basics	¼, ½, or 1 *Max credit = 1*	License Code: 27101-CTE Information Technology ♦ 5-12
27102	Computer Software Applications	9-12	Semester modules in computer applications may include a broad-based overview of office suites or skills leading to high-level competencies in spreadsheets, databases, presentations, desktop publishing, etc. Students will gain skills at the proficient or expert level in office suite software. Successful attainment of competencies within each office suite prepares students for industry certification, such as MOUS (Microsoft Office User Specialist).	½, 1, or 2 *Max credit = 2*	License Code: 27102-CTE Computer Software ♦ 5-12
27111	Internet of Things (IoT) Fundamentals	9-12	Internet of Things (IoT) Fundamentals provides students with a comprehensive understanding of the Internet of Things (IoT). It develops foundational skills using hands-on lab activities that stimulate the students to apply creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business. Outcoming students can ideate, design, prototype, and present an IoT solution for an identified business or society need.	½ or 1 *Max credit = 1*	License Code: 27111-CTE Internet of Things (IoT) Fundamentals ♦ 5-12
27120	Introduction to Programming Languages	9-12	This course will provide students with a solid foundation for understanding the fundamental concepts of programming languages. It will include coverage of concepts and constructs from languages like C#, JAVA™, JavaScript™, Perl, PHP, Python, Ruby, XHTML, XSLT, and JSP.	½ or 1 *Max credit = 1*	License Code: 27120-CTE Introduction to Programming Languages ♦ 5-12

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27121	Integrated Mathematics for Computer Science/Information Technology (Career and Technical Education Information Technology) ♦ Prerequisite: Algebra I and Computer Science Programming	9-12	This course is computer science with a major focus on math. Course topics are divided into six areas: sets, functions, and relations; basic logic; proof techniques; counting basics; graphs and trees; and discrete probability. Mathematical topics are interwoven with computer science applications to enhance the student's understanding of the introduced mathematics while students develop the ability to see computational problems from a mathematical perspective. Topics also include the study of properties and operations of the real number system, evaluating rational algebraic expressions, solving and graphing first-degree equations and inequalities, translating word problems into equations, operations with and factoring of polynomials, and solving simple quadratic equations. Algorithms in both mathematics and computer science contexts will be explored in depth. ***Note: This course can only be taught for Career and Technical Education – Information Technology credit. For Computer Science credit, Integrated Mathematics for Computer Science/Information Technology can be found under Computer Science. For Mathematics credit, Integrated Mathematics for Computer Science/Information can be found under Mathematics.***	½ or 1 *Max credit = 1*	License Code: 27121-Integrated Mathematics for Computer Science/Information Technology ♦ 9-12
27122	Programming Essentials-Visual Basics	9-12	Basic programming concepts are presented, which are transferable to other programming languages. Foundational concepts and fundamentals of computer programming, including logic, design, coding, structure, and controls, are addressed. Careers in programming are explored, and students are provided opportunities to increase their communication, teamwork, and critical thinking skills. Business projects show how programming skills are used in the business world.	½ or 1 *Max credit = 1*	License Code: 27122-CTE Programming Essentials-Visual Basics ♦ 9-12
27123	Programming Essentials-Python	9-12	The course aims to familiarize the student with general computer programming concepts like conditional execution, loops, Python programming language syntax, semantics, and the runtime environment, as well as with general coding techniques and object-oriented programming.	½ or 1 *Max credit = 1*	License Code: 27123-CTE Programming Essentials-Python ♦ 9-12

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GRADES 9-12

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27124	Programming Essentials – C++	9-12	This course teaches the basics of programming in the C++ programming language and the fundamental concepts and techniques used in object-oriented programming. The course begins with the universal basics, without relying on object concepts, then gradually extends to advanced concepts encountered using the objective approach. This course focuses on the following: • Describe the universal concepts of computer programming. • Use the syntax, semantics, and basic data types of the C++ language. • Resolve typical implementation problems using standard C++ language libraries.	½ or 1 *Max credit = 1*	License Code: 27124-CTE Programming Essentials-C++ ♦ 9-12
27125	Fundamentals of JAVA Programming	9-12	The Fundamentals of JAVA Programming Language course provides a conceptual understanding of Object-Oriented programming. The course also teaches students how to use JAVA's Conditional Control Structures, Loop Structures and Strings, Classes and Object-Oriented Development, Inheritance and Polymorphism, Arrays, GUIS, and Event-Driven Programming.	½ or 1 *Max credit = 1*	License Code: 27125-Fundamentals of JAVA Programming ♦ 9-12
27127	Advanced JAVA Programming	9-12	The Advanced JAVA Programming course will present concepts similarly covered by Advanced Placement Computer Science and is comparable to an introductory sequence of courses for computer science majors offered in college and university computer science departments. Students completing the course will be able to design and implement computer-based solutions to problems in several application areas; learn, organize, and process well-known algorithms and data structures; be able to develop and select appropriate algorithms and data structures to demonstrate problem-solving; design strategies and methodologies; analyze potential solutions, and understand the ethical and social implications of computing. The course emphasizes object-oriented and imperative problem-solving and design using Java language, representing proven approaches for developing solutions that can scale up from small, simple problems to large, complex problems. Students will be able to code fluently in a well-structured fashion using the programming language JAVA and read and understand a large program and a description of the design and development process leading to such a program. ***Note: This course can only be taught for Career and Technical Education – Information Technology credit. For Mathematics credit, Advanced JAVA Programming can be found under Mathematics.***	½ or 1 *Max credit = 1*	License Code: 27127-Advanced JAVA Programming ♦ 9-12

HIGH SCHOOL INFORMATION TECHNOLOGY COURSE CODES
GRADES 9-12

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27128	Mobile Applications Development	9-12	This course will introduce students to mobile application development and management using various commercial and open-source software. Topics to be included in the course are (1) Installation and modification of application; (2) Code modification; (3) Design and implementation; (4) Database systems management; (5) Security; and (6) Customer Service.	½ or 1 *Max credit = 1*	License Code: 27128-Mobile Applications Development ♦ 9-12
27130	Computer Gaming and Design	9-12	Computer Gaming and Design courses prepare students to design computer games by studying design, animation, artistic concepts, digital imaging, coding, scripting, multimedia production, and gameplay strategies. Advanced course topics include, but are not limited to, level design, environment, and 3D modeling, scene and set design, motion capture, and texture mapping.	½ or 1 *Max credit = 1*	License Code: 27130-CTE Computer Gaming and Design ♦ 5-12
27131	Advanced Gaming & Design	9-12	Advanced Computer Game Design courses explore the creative, technical, and conceptual aspects of designing and producing game experiences and products, including reactive (sensory-based devices) and interactive technologies, 3D game mechanics, interface design, games for mobile device applications, social media, and web multimedia, and/or augmented and virtual reality games. Topics may include aesthetic meaning; artistic, design, and technical methods and practices; game construction and development; game theory and dynamics; analysis and media literacy; construction, development, processing, modeling, and programming of game-based experiences; their transmission, distribution, placement, and marketing; and contextual, cultural, and historical aspects and considerations.	½ or 1 *Max credit = 1*	License Code: 27130-CTE Computer Gaming and Design ♦ 5-12
27170	Introduction to Web Design	9-12	The Web Design course is an introductory standards-based course on Web Design. The course includes learning experiences in basic HTML, modern web features including Cascading Style Sheets (CSS) and interactivity, web standards and accessibility, creation of web media, and planning, development, publishing, and evaluation of websites. The course is based upon the ISTE's National Educational Technology Standards for Students (NET-S), 21st Century Skills, and the ACM Model Curriculum for K-12 Computer Science.	½ or 1 *Max credit = 1*	License Code: 27170-Introduction to Web Design ♦ 9-12

HIGH SCHOOL INFORMATION TECHNOLOGY COURSE CODES
GRADES 9-12

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27219	Computer Hardware and Operating Systems (A+)	9-12	An introductory course focusing on essential hardware and operating system competencies for an entry-level PC service technician. Students will demonstrate basic knowledge of installing, configuring, upgrading, troubleshooting, and repairing microcomputers and operating systems. Work-based strategies appropriate for this course. Computer Hardware related careers are explored, and students are provided with opportunities to increase their communication, teamwork, and critical thinking skills. Students completing the full-year program will be prepared for computer industry certification, such as CompTIA's A+ certification exam or IC3 certification. (Possible curriculum: ExplorNet, HP/Cisco Sponsored IT Essentials Part 1, Aries, Computer Prep, Element K, etc.)	½, 1, or 2 *Max credit = 2*	License Code: 27219-Computer Hardware and Operating Systems (A+) ♦ 9-12
27220	IT Essentials 2	9-12	This course introduces and extends the knowledge of operating systems, the benefits of networking, and types of networks. The physical components of a network are reviewed, including the NIC, types of media, and networking devices that provide Internet connections. The concepts covered in this course include TCP/IP networking, IP addressing, name resolution, and protocols. The importance of a hardware inventory list is stressed, as is verifying compatibility with the network. The steps to install a network operating system, including Windows 2000 and Linux, are covered in detail. The course introduces the responsibilities of a network administrator, including managing users and groups, and creating directories, passwords, and permissions. It covers backup methods and strategies, partition and process management, monitoring server resources, and analyzing network performance. The course discusses troubleshooting the operating system, including identifying the type of problem, creating an emergency boot disk, and the process of disaster recovery. It addresses security issues and how to assess security needs and develop an acceptable-use policy to prevent inside and outside threats. This course will help prepare students for CompTIA's Server+ certification exam.	½ or 1 *Max credit = 1*	License Code: 27220-IT Essentials ♦ 9-12

HIGH SCHOOL INFORMATION TECHNOLOGY COURSE CODES
GRADES 9-12

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27265	Introduction to Networking	9-12	This introduction to networking course introduces students to the principles and practices of designing, building, and maintaining computer networks. Topics include networking administration and support, media and topologies, protocols and standards, network implementation, and network support. The course would prepare students for CompTIA's Network + certification.	½ or 1 *Max credit = 1*	License Code: 27265-Introduction to Networking ♦ 9-12
27266	CCNA Introduction to Networks	9-12	CCNA Introduction to Networks is the first of the four courses leading to the CCNA industry certification. This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the course. Students can build simple LANs, perform basic configuration for routers and switches, and implement IP addressing schemes.	½ or 1 *Max credit = 1*	License Code: 27266-CTE CCNA Introduction to Networks ♦ 9-12
27267	CCNA Routing & Switching Essentials ♦ Prerequisite: CCNA Introduction to Networks	9-12	CCNA Routing and Switching Essentials are the second of four courses that leads to the CCNA industry certification. This course describes a small network's architecture, components, and operations of routers and switches. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPng, single-area, and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks. Students completing this course can choose to complete the CCENT industry certification.	½ or 1 *Max credit = 1*	License Code: 27267-CTE CCNA Routing & Switching Essentials ♦ 9-12
27268	CCNA Scaling Networks ♦ Prerequisite: CCNA Routing & Switching Essentials	9-12	CCNA Scaling Networks is the third of four courses that lead to the CCNA industry certification. This course describes the architecture, components, and operations of routers and switches for advanced functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, and STP in IPv4 and IPv6 networks. Students will also develop the knowledge and skills needed to implement a WLAN in a small-to-medium network.	½ or 1 *Max credit = 1*	License Code: 27268-CTE Scaling Networks ♦ 9-12

HIGH SCHOOL INFORMATION TECHNOLOGY COURSE CODES
GRADES 9-12

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27269	CCNA Connecting Networks ♦ Prerequisite: CCNA Routing & Switching Essentials	9-12	CCNA Connecting Networks is the last of four courses that lead to the CCNA industry certification. This course discusses the WAN technologies and network services required by converged applications in a complex network. The course enables students to understand the selection criteria of network devices and WAN technologies to meet network requirements. Students learn to configure and troubleshoot network devices and resolve common issues with data link protocols. Students will also develop the knowledge and skills needed to implement virtual private network (VPN) operations in a complex network.	½ or 1 *Max credit = 1*	License Code: 27269-CTE CCNA Connecting Networks ♦ 9-12
27280	Introduction to Cybersecurity	9-12	Introduction to Cybersecurity covers trends in cybersecurity and career opportunities. Course modules will define cybersecurity, explain its importance, and introduce products and processes to secure data. Students will also explore why cybersecurity is critical in business and medical industries, how hackers use unsuspecting individuals to propagate malware, and why cybersecurity is a growing profession.	½ or 1 *Max credit = 1*	License Code: 27280-CTE Introduction to Cybersecurity ♦ 9-12
27290	Introduction to Artificial Intelligence (AI)	9-12	This course offers a foundational exploration of artificial intelligence key concepts, including machine learning, neural networks, real-world applications, AI career exploration and AI Integration through hands-on experiences with practical projects and emphasizes the ethical considerations surrounding AI.	½ or 1 *Max credit = 1*	License Code: 27290 Introduction to Artificial Intelligence (AI) ♦ 9-12
27299	Special Topics	9-12	An examination of special topics in cutting-edge computer information technologies. Some topics may include geographic information systems, telecommunications, internet, data communications, etc. Before instruction, an Alternative Curriculum Form must be submitted for approval to the IT division of the Department of Career and Technical Education.	¼, ½, 1, or 2 *Max credit = 2*	License Code: 27299-CTE Special Topics ♦ 9-12
27300	Essentials of Desktop Operating Systems	9-12	Students will be introduced to the implementation and desktop support of Microsoft Windows Operating Systems. Essentials of Desktop Operating Systems course will prepare students to install one or multiple operating systems, configure and manage hardware, manage disks, troubleshoot, configure desktop environments, enable network connectivity, configure mobile computing, support remote users, monitor resources and performance, and maintain security.	½ or 1 *Max credit = 1*	License Code: 27300-CTE Windows XP Professional ♦ 9-12

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GRADES 9-12

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27305	Essentials of Desktop Operating Systems – Linux	9-12	This course teaches students the fundamentals of the Linux operating system, command line, and basic open-source concepts. This course focuses on understanding how Linux is used and the basics of the command line, applying skills using a Linux virtual machine with step-by-step and hands-on activities, and building foundational knowledge for progressively mastering Linux commands.	½ or 1 *Max credit = 1*	License Code: 27305-CTE Essentials of Desktop Operating Systems - Linux ♦ 9-12
27310	Essentials of Network Operating Systems	9-12	Essentials of Network Operating Systems courses study multi-user, multi-tasking network operating systems. In these courses, students learn the characteristics of Microsoft Windows and Linux-based operating systems and explore various topics, including installation procedures, security issues, backup procedures, remote access, TCP/IP concepts, DNS, digital certificates, and OP security extensions.	½ or 1 *Max credit = 1*	License Code: 27310-CTE Windows 2003 Server ♦ 9-12
27400	Geographic Information Systems (GIS)	9-12	Students will have the opportunity to gather technical skills in geographic information systems, remote sensing, and global positioning systems. Students will learn the basic ESRI ArcView interface in the context of local and global problems. They will gain experience in the use of global positional system (GPS) units to gather authentic data and will be able to overlay their collected data on aerial photographs and/or satellite images.	½ or 1 *Max credit = 1*	License Code: 27400-CTE Geographic Information Systems (GIS) ♦ 9-12

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| 27500 | Data Modeling and SQL | 9-12 | Students are challenged to identify patterns and connections between information that is not related; to identify key underlying business issues in complex scenarios. This course will prepare students for the "Introduction to Oracle 9i – SQL" Oracle Certified Professional exam. This course focus on the following objectives:
• Transform business requirements into an operational database utilizing a top-down, systematic approach.
• Create Entity-Relationship Diagrams that accurately model the organization's information needs and support the functions of the business.
• Map the information requirements reflected in the Entity-Relationship Model into a relational database design.
• Create physical, relational database tables to implement the database design.
• Manage a data analysis project that delivers a persuasive database design and model for a potential client.
• Solve complex business problems using data storage and retrieval techniques.
• Articulate issues involving data security and keeping the "history" of data in business systems, as well as the role of the Database Administrator in these practices.
• Use interviewing skills and techniques learned as they approach post-secondary education or future employment. | ½ or 1

Max credit = 1 | License Code: 27500-CTE Data Modeling and SQL
♦ 9-12 |

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27510	AP Computer Science Principles (CTE)	10-12	Focuses on computational thinking, which is vital for success in all disciplines. Students use computational tools to analyze and study data. They also work with large data sets to identify, analyze, and draw conclusions from trends. It also focuses on student creativity and collaboration to develop oral and written communication and problem-solving skills. Students will use software and technology to explore questions that interest them.	½ or 1 *Max credit = 1*	License Code: 27510-AP Computer Science Principles (CTE) ♦ 9-12
27520	AP Computer Science A (CTE)	10-12	AP Computer Science A is equivalent to a first-semester, college-level course in computer science. The course introduces students to computer science with fundamental topics that include problem-solving, design strategies and methodologies, organization of data (data structures), approaches to processing data (algorithms), analysis of potential solutions, and the ethical and social implications of computing. The course emphasizes object-oriented and imperative problem-solving and design using Java language. These techniques represent proven approaches for developing solutions that can scale from small, simple problems to large, complex ones. The AP Computer Science A course curriculum is compatible with many CS1 courses in colleges and universities.	½ or 1 *Max credit = 1*	License Code: 27520-AP Computer Science A (CTE) ♦ 9-12

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GRADES 9-12

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27950	Capstone-Information Technology Education	11-12	This course is the culminating and integrative experience designed to allow students to expand their knowledge in their career pathways. It is a project-based course that would take a student through the design process to a finished product, incorporating 21st Century Skills, thinking critically, and solving challenging problems. The course would include a major project, engaging in extended learning and/or an internship. The student must be able to demonstrate through their project all that they have learned in their program of study by applying it. Each capstone project should incorporate the broader community, some aspect of "giving back" to others, encouraging students to connect their project (s) to the community or to integrate outside-of-school learning experiences. Key Requirements: 1. Students would meet with the Capstone team (teacher, career advisor, administrator, and parent). 2. Lay out a plan of study (Individual CTE Learning Plan) to meet the goal determined by the Capstone team. 3. Capstone team would monitor progress (assessment) and either add to or change the individual learning plan to meet the student goals. 4. Maintain a portfolio of learning outcomes.	1/2 or 1 *Max credit = 2*	License Code: 27999-CTE Cooperative Work Experience ♦ 9-12
27995	IT Internship	9-12	This course is an integrative experience designed to allow students to expand their knowledge in the IT career pathway. It is a project-based course incorporating 21st Century Skills, including thinking critically and solving challenging problems. This course is an extension of an IT pathway class a student has already completed or is concurrently in. The student will learn, refine, and apply skills necessary to be successful in IT-related careers. Projects incorporating the broader community and/or some aspect of "giving back" to others outside of school learning experiences are highly encouraged.	½ *Max credit = 4*	License Code: 27999-CTE Cooperative Work Experience ♦ 9-12

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GRADES 9-12

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27999	Cooperative Work Experience	11-12	Provides students with a regularly scheduled, supervised employment opportunity related to Information Technology Occupations 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 Information Technology program area. There shall be a training agreement among all partners regarding 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 assessing student progress and on-site visits by the instructor during the student's placement. **NOTE: Students must be at least 16 years old and may be paid a wage by the employer.**	Maximum of ½ credit per semester, not to exceed 4 credits while in high school *Max credit = 4*	License Code: 27999-CTE Cooperative Work Experience ♦ 9-12

*   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 issued to individuals with a teaching license.