North Dakota Computer Science and Cybersecurity

Extension 9th-12th Grades

Network & Internet ES.NI	1	**Examine the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.** ES.NI.1
	2	**Explain how the characteristics of the Internet influence the systems developed on it.** ES.NI.2
	3	**Develop solutions to security threats. (CYSEC)** ES.NI.3
	4	**Give examples to illustrate how sensitive data can be affected by malware and other attacks. (CYSEC)** ES.NI.4
	5	**Describe the issues that impact network functionality (e.g., bandwidth, load, delay, topology).** ES.NI.5
	6	**Compare ways software developers protect devices and information from unauthorized access. (CYSEC)** ES.NI.6
Hardware & Software ES.HS	1	**Categorize and describe the different functions of operating system software.** ES.HS.1
	2	**Categorize the roles of operating system software.** ES.HS.2
	3	**Demonstrate familiarity and knowledge of the programming environment.** ES.HS.3
Troubleshooting ES.T	1	**Continued growth.** ES.T.1
Algorithms & Programming ES.AP	1	**Design algorithms to solve computational problems using a combination of original and existing algorithms.** ES.AP.1
	2	**Implement searching and sorting algorithms to solve computational problems.** ES.AP.2
	3	**Evaluate algorithms in terms of their efficiency.** ES.AP.3
	4	**Evaluate key qualities of a program through a process, such as code review, program tracing, and/or critical data testing.** ES.AP.4
	5	**Demonstrate knowledge of the different types of programming errors.** ES.AP.5

	6 **Identify and correct different types of programming errors using a systematic approach.** ES.AP.6
Variables ES.V	1 **Use data structures to represent information.** ES.V.1
	2 **Compare and contrast fundamental data structures and their uses.** ES.V.2
Control Structures ES.CS	1 **Design computational artifacts using single and multi-way conditional statements.** ES.CS.1
	2 **Design computational artifacts using pretest and/or posttest repetitions.** ES.CS.2
	3 **Design computational artifacts using fixed and/or variable length repetitions.** ES.CS.3
	4 **Iteratively design and develop computational artifacts for practical intent, personal expression, or to address a societal issue.** ES.CS.4
	5 **Justify the selection of specific control structures by identifying tradeoffs associated with implementation, readability, and performance.** ES.CS.5
	6 **Demonstrate the flow of execution of a recursive algorithm.** ES.CS.6
Modularity ES.M	1 **Analyze a large-scale computational problem and identify generalizable patterns or problem components that can be applied to a solution.** ES.M.1
	2 **Decompose problems into smaller subproblems through systematic analysis.** ES.M.2
	3 **Construct solutions to problems using student-created components, such as procedures, modules, and/or objects.** ES.M.3
	4 **Demonstrate code reuse by creating programming solutions using libraries or APIs.** ES.M.4
Program Development ES.PD	1 **Iteratively evaluate and refine a computational artifact to enhance its performance, reliability, usability, and/or accessibility.** ES.PD.1
	2 **Document decisions made during the design process using text, graphics, presentations, and/or demonstrations in the development of complex programs.** ES.PD.2
	3 **Develop and use a series of test cases to verify that a program performs according to its design specifications.** ES.PD.3
	4 **Modify an existing program to add additional functionality and discuss intended and unintended implications.** ES.PD.4

	5 Explain security issues that might lead to compromised computer programs. ES.PD.5
	6 Internally document coding structures. ES.PD.6
Access: Conduct basic searches to gather information from teacher provided digital sources. ES.A	**1** Continued growth. ES.A.1
Evaluate: Evaluate information sources based on purpose. Recognize when the purpose of content is to inform or to influence actions. ES.E	**1** Continued growth. ES.E.1
Create: Products are used to share information with others. ES.C	**1** Evaluate the ability of models and simulations to test and support hypotheses. ES.C.1
Impacts of Computing: The past, present, and possible future impact of technology on society. People use many types of technologies in their daily work and personal lives. ES.IC	**1** Continued growth. ES.IC.1
Social Interactions: Communication with peers, teachers, and others using technology. ES.SI	**1** Continued growth. ES.SI.1
Safety, Law, and Ethics: Positive and negative social and ethical behaviors for using technology. ES.SLE	**1** Evaluate computational artifacts to maximize their beneficial effects and minimize harmful effects on society. ES.SLE.1
Responsible Use: Safe and ethical behaviors in	**1** Continued growth. ES.RU.1

the digital world. ES.RU

Privacy: Personal privacy concepts. ES.P

1 **Continued growth.** ES.P.1