Michigan Computer Science

Level 3A: High School (Grades 9-10)

COMPUTING SYSTEMS 3A-CS	1 **Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects.** 3A-CS-01
	2 **Compare levels of abstraction and interactions between application software, system software, and hardware layers.** 3A-CS-02
	3 **Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.** 3A-CS-03
NETWORKS AND THE INTERNET 3A-NI	4 **Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.** 3A-NI-04
	5 **Give examples to illustrate how sensitive data can be affected by malware and other attacks.** 3A-NI-05
	6 **Recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts.** 3A-NI-06
	7 **Compare various security measures, considering tradeoffs between the usability and security of a computing system.** 3A-NI-07
	8 **Explain tradeoffs when selecting and implementing cybersecurity recommendations.** 3A-NI-08
DATA AND ANALYSIS 3A-DA	9 **Translate between different bit representations of real-world phenomena, such as characters, numbers, and images.** 3A-DA-09
	10 **Evaluate the tradeoffs in how data elements are organized and where data is stored.** 3A-DA-10
	11 **Create interactive data visualizations using software tools to help others better understand real-world phenomena.** 3A-DA-11
	12 **Create computational models that represent the relationships among different elements of data collected from a phenomenon or process.** 3A-DA-12

ALGORITHMS AND PROGRAMMING 3A-AP

13 **Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.** 3A-AP-13

14 **Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables.** 3A-AP-14

15 **Justify the selection of specific control structures when tradeoffs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices made.** 3A-AP-15

16 **Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions.** 3A-AP-16

17 **Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.** 3A-AP-17

18 **Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.** 3A-AP-18

19 **Systematically design and develop programs for broad audiences by incorporating feedback from users.** 3A-AP-19

20 **Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries.** 3A-AP-20

21 **Evaluate and refine computational artifacts to make them more usable and accessible.** 3A-AP-21

22 **Design and develop computational artifacts working in team roles using collaborative tools.** 3A-AP-22

23 **Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs.** 3A-AP-23

IMPACTS OF COMPUTING 3A-IC

24 **Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.** 3A-IC-24

25 **Test and refine computational artifacts to reduce bias and equity deficits.** 3A-IC-25

26 **Demonstrate ways a given algorithm applies to problems across disciplines.** 3A-IC-26

27 **Use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.** 3A-IC-27

28 **Explain the beneficial and harmful effects that intellectual property laws can have on innovation.** 3A-IC-28

29 **Explain the privacy concerns related to the collection and generation of data through automated processes that may not be evident to users.** 3A-IC-29

30 **Evaluate the social and economic implications of privacy in the context of safety, law, or ethics.** 3A-IC-30