

# FBLA Collegiate Foundations of Technology\*

## Foundations of Computer Systems (15 test items)

1. Describe memory organization in computer systems (e.g., memory hierarchy, caches, registers)
2. Describe differences between digital, analog, discrete, and continuous systems
3. Describe different logic gates and their combinations (AND, OR, NOT, NAND, etc.)
4. Discuss methods for backing up a computer system
5. Discuss scheduling algorithms and their performances
6. Describe simple problems and solutions as state machines
7. Describe primary operating system components (e.g., registry, virtual memory, file system)
8. Analyze the functions of operating systems

## Data and AI Foundations (15 test items)

1. Discuss probabilistic and logic-based reasoning
2. Describe foundational algorithms for artificial intelligence (e.g., minimax, search algorithms, alpha-beta pruning)
3. Analyze challenges associated with big data systems
4. Discuss data sourcing, acquisition, and processing
5. Discuss the benefits of cloud computing for data processing
6. Discuss the use of data in AI and machine learning
7. Analyze the use and training of large language models (LLMs)

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\* Sources: These learning outcomes are based on content from Computing Competencies for Undergraduate Data Science, Computing Competencies for Undergraduate Programs in Information Systems, Information Technology Curricula 2017, K-12 Computer Science Standards, and Ohio's Learning Standards for Technology.

## Hardware and Software Foundations (15 test items)

1. Discuss considerations when using peripheral equipment (e.g., external storage, printers, USB)
2. Describe common methods of computer hardware maintenance
3. Discuss the characteristics of different types of computers (e.g., mainframe, PC, mobile)
4. Describe computer components (e.g., CPU, motherboard, GPU)
5. Discuss the functions of RAM and secondary storage (e.g., HDD, SDD)
6. Describe storage devices and configurations (e.g., HDD, SSD, RAID, NAS)

## Networking Systems and Protocols (20 test items)

1. Discuss the characteristics of different types of networks (e.g., LAN, MAN, WAN)
2. Explain basic networking protocols (e.g., TCP/IP, UDP, DHCP, SMP)
3. Discuss methods of connectivity (e.g., Ethernet, Wi-Fi, cable)
4. Describe the general architecture of networks (e.g., nodes, connections, switches)
5. Select an appropriate networking architecture for a business (e.g., peer-to-peer, client-server, intranet)
6. Discuss the pros and cons of network topologies (e.g., bus, star, ring)
7. Explain the purpose and mechanics of IP addressing
8. Troubleshoot network maintenance issues (e.g., securing and protecting cable)
9. Discuss common network security techniques (e.g., authorization, authentication)

## Ethics and Technology (10 test items)

1. Discuss illegal use of online technology (e.g., piracy, licensing infringement, jailbreaking for illegal purposes)
2. Discuss ethical concerns related to generative AI
3. Discuss the ethics of data brokerage and privacy online
4. Discuss ethical concerns related to AI assistants and LLMs

## Programming and Algorithms (15 test items)

1. Discuss the attributes, methods, and variables of classes and objects
2. Discuss characteristics of programming language paradigms (e.g., functional, object-oriented, imperative, declarative)
3. Analyze the time complexity of simple algorithms
4. Interpret blocks of code
5. Describe basic data structures (e.g., arrays, lists, hashmaps)
6. Describe key features of object-oriented programming (e.g., encapsulation, abstraction, polymorphism, inheritance)
7. Describe basic search and sorting algorithms
8. Discuss APIs, modules, and libraries

## Security Foundations (10 test items)

1. Discuss the applications of confidentiality, integrity, and availability
2. Evaluate vulnerabilities in a digital system (e.g., human error, authorization, authentication)
3. Describe strategies to defend against common cyber attacks (e.g., DoS, DDoS, virus)
4. Explain how insecure coding practices can lead to vulnerabilities (e.g., buffer overflow, race conditions, SQL injection)
5. Describe the differences between symmetric and asymmetric encryption
6. Discuss the use of hashing in cryptography (SHA-256, blockchain, digital signatures, etc.)

## References

- Association for Computing Machinery. *Computing Competencies for Undergraduate Data Science*.  
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