Special Topics in Computer Science

UNIT 1: Data Science

ESSENTIAL QUESTION	BIG IDEAS
How can data scientists use their skills to draw meaningful insights and solve organizational problems?	1. Data Collection 2. Management of Data 3. Statistical Analysis of Data 4. Training Machine Learning with Data 5. Communication and Visualization of Data

GUIDING QUESTIONS

- **Content**
  - What is data science and why is it important?
  - What are the key data analysis techniques used in data science?
  - What are the ethical considerations involved in collecting, managing, and analyzing data?

- **Process**
  - How can the data collection process be optimized to ensure accuracy and completeness?
  - How can the data transformation process be used to prepare data for analysis?
  - How can the data visualization process be used to communicate insights effectively?

- **Reflective**
  - Why is it important to approach data science in an ethical and responsible manner?
  - Why is it important to communicate data insights effectively?
  - Why is it important to stay up-to-date with the latest data science tools and techniques?

FOCUS STANDARDS

- CSTA Standards (https://drive.google.com/file/d/1-dPTAl1yk2HYPKUWZ6DqaM6aVUDa9iby/view)
  - 3B-DA-05 - Use data analysis tools and techniques to identify patterns in data representing complex systems.
  - 3B-DA-06 - Select data collection tools and techniques to generate data sets that support a

claim or communicate information.
    - 3B-DA-07 - Evaluate the ability of models and simulations to test and support the refinement of hypotheses.

SUPPORTING RESOURCES

- Data Science - CodeHS - https://codehs.com/uploads/817765d2a1fe6d7b81c450ecf6befdbe

Special Topics in Computer Science

UNIT 2: Artificial Intelligence

ESSENTIAL QUESTION	BIG IDEAS
How can we responsibly design and implement Artificial Intelligence algorithms to address real-world problems, and what are the ethical considerations involved in their use?	1. Understanding AI Fundamentals 2. Exploring Ethical and Social Implications of AI 3. Hands-On AI Projects 4. Limitations of AI 5. Analyzing Big Data with AI

GUIDING QUESTIONS

- **Content**
  - What is AI, and what are some examples of AI applications in our daily lives?
  - What are the different types of AI, and how do they differ in terms of functionality and application?
  - What ethical considerations should be taken into account when designing and implementing AI systems?
- **Process**
  - How do you gather and prepare data to be used in training an AI model?
  - How can you optimize an AI model to improve its accuracy and efficiency?
  - How can you ensure that an AI system avoids introducing bias or other ethical concerns into the decision-making process?
- **Reflective**
  - Why is it important to understand the limitations and potential drawbacks of AI?
  - Why is it important to continually monitor and update AI systems to ensure they are accurate and relevant?
  - Why is it important to ensure that AI systems are transparent and explainable?

FOCUS STANDARDS

- KSDE Standards (https://www.ksde.org/Portals/0/CSAS/Content%20Area%20(A-E)/Computer%20Science/Kansas%20Computer%20Science%20Model%20Standards%20with%20Description.pdf?ver=2019-04-23-165056-093)
    - L2.AP.A.01 - Describe how artificial intelligence algorithms drive many software and physical systems (e.g., digital advertising, autonomous robots, computer vision, pattern recognition, text analysis).
    - L2.AP.A.02 - Describe how artificial intelligence drives many software and physical systems.
    - L2.AP.A.04 - Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem.

SUPPORTING RESOURCES

- Artificial Intelligence - CodeHS - https://codehs.com/uploads/c71e1c0e6d77b010b1a6de64315a4ee9

Special Topics in Computer Science

UNIT 3: Cybersecurity

ESSENTIAL QUESTION	BIG IDEAS
Why is cybersecurity important?	1. Ethics 2. Establishing Trust 3. Connectivity 4. Data & System Security 5. Adversarial Thinking 6. Risk & Implications

GUIDING QUESTIONS

- **Content**
  - What is essential for establishing trust in cybersecurity?
  - What is an ethical way to disclose vulnerabilities?
  - What policies and procedures are in place to keep data safe?
  - What are the ways in which data can be encrypted?
  - What are the consequences of less secure hardware and software?

- **Process**
  - How do values shape the security considerations of designers and users?
  - How do network security technologies keep our systems and data secure?
  - How does the logical pliability of computers contribute to the complexity of cybersecurity risk?
  - How does the dynamic, distributed, and ubiquitous nature of computing contribute to the complexity of cybersecurity risk?

- **Reflective**
  - Why is privacy essential for individuals, groups, and governments?
  - Why do hardware and software have security vulnerabilities?

FOCUS STANDARDS

- CSTA Standards
  - 2-NI-06 Apply multiple methods of encryption to model the secure transmission of information.
  - 3A-NI-06 Recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts.
  - 3A-NI-08 Explain tradeoffs when selecting and implementing cybersecurity recommendations.
  - 3B-NI-04 Compare ways software developers protect devices and information from unauthorized access.

SUPPORTING RESOURCES

- Cybersecurity - CodeHS - https://codehs.com/uploads/bf320e3d693aad11f460d2467b4936fa

Special Topics in Computer Science

UNIT 4: Mobile Development

ESSENTIAL QUESTION	BIG IDEAS
What are the fundamental principles and best practices for developing effective and engaging mobile applications?	1. Intro to mobile development 2. Native development (Swift or Java/Kotlin) 3. Testing and debugging 4. Mobile app game development 5. Deployment and version control

GUIDING QUESTIONS

- **Content**
  - What languages are available to use to create a mobile application?
  - What are the essential elements of a great mobile user interface?
  - What are the differences between native app development and cross-platform app development?
- **Process**
  - How can you design a mobile user interface that effectively communicates the app's purpose?
  - How can you choose the right mobile app development platform for your project?
  - How can you effectively maintain and update your mobile app over time?
- **Reflective**
  - Why is mobile app development crucial for businesses?
  - Why is mobile app security and privacy a critical issue?
  - Why is user experience design important when developing a mobile app?

FOCUS STANDARDS

- Kansas Computer Model Standards
    - L2.AP.PD.03 Develop programs for multiple computing platforms.
    - L1.AP.M.01 Create computational artifacts by systematically organizing, manipulating, and/or processing data.
    - L1.AP.M.02 Systematically design and develop programs for broad audiences by incorporating feedback from users.

SUPPORTING RESOURCES

- Mobile Development - CodeHS - https://codehs.com/uploads/b518cc81f656d2e10160ada8c535158b