

# DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

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## Chair

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## Faculty

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## Bachelor's

- Computer Science, Bachelor of Science with a Concentration in Artificial Intelligence in Data Science (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-artificial-intelligence-data-bs/>)
- Computer Science, Bachelor of Science with a Concentration in Computer Science (General) (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-general-bs/>)
- Computer Science, Bachelor of Science with a Concentration in Computer Technology (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-technology-bs/>)
- Computer Science, Bachelor of Science with a Concentration in Interactive Multimedia (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-concentration-interactive-multimedia-bs/>)
- Cyber Systems Technology, Bachelor of Science with a Concentration in Network Security and Electronics (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-systems-technology-concentration-network-security-electronics-bs/>)
- Cyber Systems Technology, Bachelor of Science with a Concentration in Tech Systems (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-systems-technology-concentration-tech-bs/>)
- Digital Forensics and Cybersecurity, Bachelor of Science (B.S.) (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/digital-forensics-cybersecurity-bs/>)

## Accelerated

- Cyber Systems Technology, Bachelor of Science (B.S.) & Technology Management Master of Science (M.S.) [Cyber Systems Tech Security Concentration] Accelerated 3+2 Dual Degree Program (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber->

[systems-technology-bs-management-ms-tech-security-management-concentration-accelerated-dual-degree-program/](http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-systems-technology-bs-management-ms-tech-concentration-accelerated-dual-degree-program/))

- Cyber Systems Technology, Bachelor of Science (B.S.) & Technology Management Master of Science (M.S.) [Tech Systems Concentration] Accelerated 3+2 Dual Degree Program (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-systems-technology-bs-management-ms-tech-concentration-accelerated-dual-degree-program/>)

## Minor

- Computer Electronics Technology, Minor (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-electronics-technology-minor/>)
- Computer Science, Minor (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/computer-science-minor/>)
- Cybersecurity and Intelligence, Minor (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cybersecurity-intelligence-minor/>)
- Game Content Design, Minor (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/game-content-design-minor/>)
- Informatics, Minor (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/informatics-minor/>)

## Certificate

- Artificial Intelligence in Data Science, Departmental Certificate (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/artificial-intelligence-data-science-departmental-certificate/>)
- Cyber Security and Digital Forensics, Departmental Certificate (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-security-digital-forensics-certificate/>)
- Cyber Systems and Network Security, University Certificate (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/cyber-systems-network-security-certificate/>)
- Game Design, Departmental Certificate (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/game-design-certificate/>)
- Informatics, Departmental Certificate (<http://catalogs.eku.edu/undergraduate/science-technology-engineering-mathematics/computer-science-information-technology/informatics-certificate/>)

## Courses

### Computer Science

#### CSC 101. The World of Code. (3 Credits)

A. Prerequisite: Completion of all academic readiness requirements. Introduction to computational thinking through the exploration of code, its place in our lives, and the use of code for problem-solving. A beginning programming language will be used to explore key coding concepts such as making decisions and repetition.

#### CSC 140. Introduction to Computer Game Design. (3 Credits)

I, II. Prerequisite: a grade of "C" or higher in both CSC 185 and CSC 190. Introduction to computer game design, frame based animation, sound effects, program logic, game scripting, and object oriented programming.

#### CSC 160. Introduction to Web Programming. (3 Credits)

A. Prerequisite: MAT 112 A/B or higher with a grade of "C" or higher, or a minimum score of 22 on the mathematics portion of the ACT, or a minimum score of 530 on the math portion of the SAT, or a passing grade of the math Algebra placement test. Introduction to problem solving with computers and the Internet using an appropriate programming language. Basic concepts include data types, objects, control structures, functions, and input/output features. Gen. Ed. VII (QS).

#### CSC 170. Intro to Game Programming. (3 Credits)

A. Prerequisite: MAT 112 or 112B or 114 with a grade of "C" or better, or Math ACT score of 23 or higher, or Math SAT score of 560 or higher. Introduction to game programming using Python. Programming concepts including data types, input/output, and control structures will be introduced through the construction of various types of 2-D games. 3 Lecture/Lab.

#### CSC 174. Introduction to Programming for Science & Engineering. (3 Credits)

I, II. Prerequisite: MAT 122 or higher with a minimum grade of C, a minimum score of 25 on the mathematics portion of the ACT, or a minimum score of 590 on the math portion of the SAT. Introductory programming for scientific and engineering applications, input/output, decision, loops, arrays, subroutines, functions, files and simulation. Gen. Ed. VII (QS).

#### CSC 177. Introduction to Visual Basic. (3 Credits)

I, II. Prerequisite: MAT 112 A/B or higher with a grade of "C", or a minimum score of 22 on the mathematics portion of the ACT, or a minimum score of 530 on the math portion of the SAT, or a passing score on a math Algebra placement test. Introduction to programming in the event driven/graphical programming language Visual Basic. Topics include forms, common controls/objects, coding, procedures, file management and developing Windows applications. Gen. Ed. VII (QS).

#### CSC 178. Introduction to \_\_\_\_\_. (1-3 Credits)

A. Prerequisite: Minimum ACT Math score of 19, Minimum SAT math score of 510, or completion of MAT 105 or higher with a "C" or higher grade. Introduction to selected topics in computer science. May be retaken to a maximum of nine hours, provided the topics are different.

#### CSC 185. Discrete Structures I. (3 Credits)

I, II. Prerequisite: MAT 122 or higher with a grade of "C" or higher, or a minimum score of 25 on the mathematics portion of the ACT, or a minimum score of 590 on the math portion of the SAT. Introduce basic mathematical structures and logical principles for computer science. Practice step-by-step problem solving in support of good algorithm design and verification practices. Topics include basic counting, sequences, series and recurrence relations.

#### CSC 189. Computing Concepts and Programming. (3 Credits)

(3) A. Prerequisite: MAT 122 or higher (minimum grade of C) or a minimum of 25 on the mathematics portion of the ACT or a minimum of 590 on the mathematics portion of the SAT. Introduction to the computing concepts and programming. Topics include numbering systems, computing system concepts, problem solving with computers using an object-oriented programming language. 2 Lec/2 Lab.

#### CSC 190. Object- Oriented Programming I. (3 Credits)

I, II. Prerequisite: MAT 122 or higher with a grade of "C" or higher, a minimum of 25 on the mathematics portion of the ACT or a minimum of 590 on the mathematics portion of the SAT. Introduction to problem solving with computers using an object-oriented programming language. Concepts include data types, input/output, classes, control structures, and arrays. 3 Lec/2 Lab. Gen. Ed. VII (QS).

#### CSC 191. Object-Oriented Programming II. (3 Credits)

I, II. Prerequisite: a minimum grade of "C" in both CSC 185 and CSC 190. Object-oriented programming, recursion, arrays, inheritance, file input/output, exception handling, multi-thread programming, GUI, object-oriented analysis and design. 3 Lec/2 Lab.

#### CSC 195. Discrete Structures II. (3 Credits)

I, II. Prerequisites: a minimum grade of "C" in both CSC 185 and CSC 190. Develop foundation and analysis technique in mathematical structures for computing. Topics include sets, relations, functions; logic; algorithm design/ analysis, recursive algorithms, recurrence relations, mathematical induction, counting, probability. 3 Lec/2 Lab.

#### CSC 210. Data Structures and Programming. (3 Credits)

(3) A. Prerequisite: A minimum grade of "C" in CSC 189 or CSC 190. Object-oriented programming, inheritance, arrays, stacks, queues, trees, hashing, recursions, and exception handling. 3 Lec/2 Lab.

#### CSC 250. Intro to Interactive Games/App. (3 Credits)

A. Prerequisite: CSC 190 with a minimum grade "C". Introduction to multimedia programming and scripting. Topics include frame-based animation, video editing, sound effects, program logic, and object-oriented programming. Credit will not be awarded to student who have credit for for CSC 140.

#### CSC 302. Introduction to System Environ. (3 Credits)

I, II. Prerequisite: CSC 191 with a minimum of grade of  $\geq C-\geq$ . Introduction to computer system environments, utilities, system programming, system administration, networking and operating systems.

#### CSC 306. Ethics for the Comput Profess. (3 Credits)

A. Prerequisite: CSC 191 with a minimum grade of  $\geq C-\geq$ . Responsibilities of the computing professional, social implications of computing, privacy, crime and abuse, risk and liabilities, copyright, and patents.

#### CSC 308. Mobile App Development for Apple iOS. (3 Credits)

Prerequisite: A minimum grade of "C" in CSC 191 and CSC 195 or in CSC 210. Introduction to developing mobile applications for Apple iOS. Topics include development tools, APIs, user interfaces, mobile-specific technologies and application design.

#### CSC 309. Mobile App Dev for Android. (3 Credits)

(3) A. Prerequisite: A minimum grade of "C" in CSC 191 and CSC 195 or in CSC 210. Introduction to developing mobile device web sites and applications for Android. Topics include development tools, APIs, user interfaces, mobile-specific technologies and application design.

#### CSC 310. Data Structures. (3 Credits)

I, II. Prerequisites: CSC 191 and CSC 195 with a minimum grade of C in both. The application and implementation of data structures including arrays, stacks, queues, linked lists, and trees. Internal searching and sorting techniques. The analysis of algorithms.

**CSC 311. Algorithms I. (3 Credits)**

A. Prerequisites: CSC 191, CSC 195, and MAT 234 or MAT 234H with a grade of "C" or better in all three courses. Logic and proof, mathematical induction; order of magnitude, recurrence, relations, analysis of recursive algorithms; Boolean algebra and logic networks, networks for adding, merging and sorting; matrices; finite state machines, push-down automata, linear bound automata, Turing machines; formal languages.

**CSC 312. File Processing. (3 Credits)**

I, II. Prerequisite: CSC 310 with a minimum grade of "C". File organization and file storage devices. Topics include external sorting, sequential file processing, hashing, B+ trees, and introduction to databases.

**CSC 313. Database Systems. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 191 and CSC 195 or in CSC 210. Introduction to databases, storage and retrieval of data, report generation, interface and application development, online queries, XML, multimedia database, and database security.

**CSC 315. 3D Modeling. (3 Credits)**

A. Prerequisite: CSC 191 and CSC 195 with a grade of "C" or better in both courses. An introduction to geometric representations in 3D. Topics include polygon and spline modeling, texture mapping, materials, 3D scanning, and topics in animation including character rigging.

**CSC 316. 3D Game Engine Design. (3 Credits)**

A. Prerequisite: A grade of "C" or higher in CSC 310. Introduction to 3D animation and programming. Topics include coordinate systems, vertices, lines, polygons, geometric objects, 3D models, motion control, and interaction design.

**CSC 320. Algorithms II. (3 Credits)**

A. Prerequisites: CSC 310 and 311 with a minimum grade of "C" in both courses. Fundamental algorithms required in computer science; algorithm design/analysis methods, graph algorithms, probabilistic and parallel algorithms, and computational models.

**CSC 330. System Environments & Networks. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 191 or in CSC 210. Introduction to computer system environments, utilities, system administration, and networking.

**CSC 332. Digital Storage Device Forensics. (3 Credits)**

A. Prerequisite: a minimum grade of "C" in CSC 210 or CSC 310. Introduction to digital storage forensics. Topics include digital investigation fundamentals, fundamentals of storage devices (hard disk, optical, flash, consumer electronics devices, and mobile devices), disk volume analysis, and file systems analysis (FAT/NTFS, Ext 2/3/4, UFS 1/2, HFS/HFS+/HFSX).

**CSC 338. Fundamentals of Cybersecurity. (3 Credits)**

Pre-requisite: A minimum grade of "C" in CSC 210 or CSC 310. This course discusses the fundamentals of cybersecurity. Topics include information security principles, network and Internet basics, hacker techniques, cybersecurity technologies, encryption, security policies, cyber terrorism and information warfare, cyber detective, digital forensics, cybersecurity engineering, and society security.

**CSC 340. Ethics & Software Engineering. (3 Credits)**

A. Prerequisite: CSC 310 and 313 with a minimum grade of "C" in both courses. Responsibilities of software professionals, social implications of software such as privacy, crime and abuse, risk and liabilities, copyright, and patents, software project planning, software requirements analysis, software design, and software testing.

**CSC 349. Applied Learning in Computer Science. (0.5-8 Credits)**

I, II; (1-6) SUMMER ONLY. Prerequisite: students must have successfully completed 30 semester hours of course work including six hours of Computer Science major courses. In addition, transfer students must have completed at least one semester of full-time course work at ECU. Work in placements related to academic studies. A maximum of three hours may be applied toward the Computer Science technology option degree only. Credit does not apply to general Computer Science major or minor requirements. Total hours: eight, associate; sixteen, baccalaureate. A minimum of 80 hours of employment is required for each semester hour of academic credit. Credit may only be awarded in the semester in which the work is completed.

**CSC 349A. Cooperative Study: Computer Science. (0.5-8 Credits)**

I, II; (1-6) SUMMER ONLY. Prerequisite: students must have successfully completed 30 semester hours of course work including six hours of Computer Science major courses. In addition, transfer students must have completed at least one semester of full-time course work at ECU. Work in placements related to academic studies. A maximum of three hours may be applied toward the Computer Science technology option degree only. Credit does not apply to general Computer Science major or minor requirements. Total hours: eight, associate; sixteen, baccalaureate. A minimum of 80 hours of employment is required for each semester hour of academic credit. Credit may only be awarded in the semester in which the work is completed.

**CSC 349B. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 349C. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 349D. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 349E. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 349F. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 349G. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 349H. Cooperative Study: Computer Science. (0.5-8 Credits)**

Work in placements related to academic studies.

**CSC 350. Principles of Prog Languages. (3 Credits)**

I, II. Prerequisites: CSC 200 and 310 with a minimum grade of "C" in both courses. The principles used in the design and implementation of programming languages. Language descriptions, structural implementations, and specialized features of languages.

**CSC 360. Computer Org & Architecture. (3 Credits)**

(3) A. Prerequisite: CSC 191 with a minimum grade of "C" or CSC 210. Information representation, instruction set architecture, assembly language, instruction execution, basic processing units, input/output organization, memory and storage organization, overlap and pipeline processing, parallel processing, and performance evaluation. Credit will not be awarded for both CSC 360 and 370.

**CSC 390. Advanced Programming Techniques with \_\_\_\_\_. (3 Credits)**

A. Prerequisite: CSC 191, with a minimum grade of "C." Advanced programming with a selected programming language, with appropriate applications. May be taken to a maximum of six hours, provided the languages are different.

**CSC 400. Operating Systems. (3 Credits)**

I, II. Prerequisites: CSC 310 and 360 with a grade of "C" or higher in both courses. Overall structure of multiprogramming systems, details of addressing techniques, memory-management, file system design and management, traffic control, interprocess communication, system module design, interfaces.

**CSC 401. Network & System Programming. (3 Credits)**

A. Prerequisites: CSC 302, CSC 370 or EET 254. Technical programming in the UNIX and the Internet environments: shell scripts, TCP/IP, HTML, CGI, and JavaScript. Survey of Internet protocols.

**CSC 410. Cyber Networking and Security. (3 Credits)**

(3) A. Prerequisite: CSC 210 or CSC 310 with a minimum grade of "C". This course discusses the fundamentals of computer networking and cyber security. Topics include layered protocols of computer network, Internet architecture and applications, cyber security and defense technologies.

**CSC 440. Applied Software Engineering. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 340. Techniques and tools for software requirements, software design, software testing, and software project planning as a team project for majors in computer science.

**CSC 460. Computer Network & System Administration. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 210 CSC 310. Introduction to the subject of computer networks and layered protocols, architecture of data communication systems, point-to-point networks, local networks, end-to-end protocols and internetworking, and server-side technology to create interactive web pages.

**CSC 490. Seminar in \_\_\_\_\_. (1-3 Credits)**

A. Prerequisite: departmental approval. For advanced students in computer science. Subject announced when offered. May be retaken to a maximum of 12 hours, provided that the topics are different.

**CSC 491. Game Design Capstone. (3 Credits)**

A. Prerequisite: CSC 140 and INF 391 with a grade of "C" or higher. Level design, storyboarding, character modeling, game scripting, game interface design, audio effects, marketing, and ethics. Students will work in groups to develop a computer game term project. May be retaken to a maximum of 6 hours.

**CSC 494. Innovative Problem Solving. (1-3 Credits)**

Prerequisite: Departmental approval. An individually developed project related to an innovative solution of a problem provided by the software industry. The result is to be presented in open forum. May be retaken to a maximum of 6 hours provided the topics are different.

**CSC 495. Independent Work. (1-3 Credits)**

I, II. Prerequisite: A grade of "C" or higher in ENG 102, 105 (B), or HON 102 and departmental approval. Directed study/ research on a problem or area chosen in consultation with the instructor. Final paper required. Student must have the independent study proposal form approved by faculty supervisor and department chair prior to enrollment. May be retaken to a maximum of twelve hours.

**CSC 496. Senior Seminar. (1 Credit)**

Prerequisite: CSC 340 with a minimum grade of "C". Critically evaluate current issues in computer science and effectively communicate creative ideas with professionals to foster collaborative problem solving.

**CSC 499. CS Career Preparation. (1 Credit)**

A. Prerequisite: CSC 310 with a grade of "C" or better. Career preparation for students seeking internship or permanent jobs. Job search, resume creation, interview techniques for application of computer science positions. 2 Lec.

**CSC 507. Special Topics:\_\_\_\_\_. (1-3 Credits)**

A. Prerequisite: departmental approval. Topics vary with offering. May be retaken to a maximum of six times, with advisor approval, provided the topics are different.

**CSC 520. Multimedia System and Forensics. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 210 CSC 310. Integration of multimedia technologies, signal processing and compression of images, audio, and video, multimedia forensics and message hiding.

**CSC 530. Programming and Data Structures. (3 Credits)**

A. Prerequisite: At least a "C" in CSC 190 and 191, or equivalent courses. The application and implementation of data structures including arrays, linked lists, stacks, queues, heaps, trees and graphs and their related algorithms, using an object-oriented programming language. Credit does not apply to the B.S. degree in Computer Science or the B.S. degree in Digital Forensics and Cybersecurity.

**CSC 535. Discrete Structures. (3 Credits)**

A. Prerequisite: MAT 112, 114 or equivalent. Corequisite: CSC 530. Logic, sets, functions, Boolean algebra, probability and their applications, number theory, recursion, math induction proofs with application of these topics to computer science.

**CSC 536. Incident Response I. (3 Credits)**

(3) A. Prerequisite: CSC 410 with a minimum grade of "C". This course discusses the details of various aspects of cybersecurity incident response. Topics include pre-incident preparation, incident detection and characterization, data collection and analysis, and remediation.

**CSC 537. Incident Response II. (3 Credits)**

(3) A. Prerequisite: CSC536 with a minimum grade of "C". This course discusses cybersecurity incident response in the context of various computing platforms. Topics include dead-box analysis, memory analysis, log analysis, and malware analysis in Windows, Linux and MacOS Systems.

**CSC 538. Computer Crime and Forensics. (3 Credits)**

A. Introductory course on computer crime and forensics. Computer criminal evidence collection, analysis and handling; computer forensics tools; data acquisition; digital evidence control; Windows and Linux systems investigation; email investigation; network forensics; computer forensic report writing.

**CSC 539. MAC Forensics. (3 Credits)**

(3) A. Prerequisite: INF 322. This course covers the basic knowledge and skills necessary to analyze MAC operating system artifacts for digital evidence recovery. The topics include: MAC OS overview, GPT partitioning system, MAC system acquisition, MAC directory structure and evidence, Property lists, User logon password recovery, Safari and Firefox artifacts, iChat artifacts, Apple mail analysis, and other related topics.

**CSC 541. Software Testing. (3 Credits)**

(3) A. Prerequisites: Senior standing and CSC 310 with a grade of "C" or higher. The purpose of this course is to study software testing process, methods, techniques and tools. Topics include black box testing, white box testing, integration testing, acceptance testing, regression testing, performance testing, stress testing, and testing of object-oriented software.

**CSC 542. Internet Forensics. (3 Credits)**

(A). Prerequisite: INF 322 with a minimum grade of "C". This course covers the basic knowledge and skills necessary to analyze Internet-based applications artifacts for digital evidence recovery. The topics include popular Web browsers, instant messengers, and social media apps.

**CSC 543. Windows Forensics. (3 Credits)**

(3) A. Prerequisite: INF 322. This course covers the basic knowledge and skills necessary to analyze MS Windows operating system artifacts for digital evidence recovery. The topics include: Windows OS overview, System bitlocker, GPT file system, Windows Security Model, Windows registry, USB devices, Windows event logs, Windows recycle bin, and other related topics.

**CSC 544. Database Admin and Security. (3 Credits)**

Prerequisite: A minimum grade of "C" in CSC 210 or CSC 310. This course covers database management system concepts, database system architecture, installation and setup, data management, performance monitoring and tuning, backup and recovery, database security models and management, database auditing.

**CSC 545. Theory of Database Systems. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 210 or CSC 310. Models and principles of information systems. Database languages. The logical and physical design as well as the implementation and use of database systems.

**CSC 546. Artificial Intelligence. (3 Credits)**

A. Prerequisite: A minimum grade of "C" in CSC 210 or CSC 310 and STA 270. The use of programming languages to model concepts selected from artificial intelligence. The application of heuristics to problem solving. Perception and pattern recognition.

**CSC 547. Network Forensic and Investigation. (3 Credits)**

A. Prerequisites: Senior standing and CSC 400 with a grade of "C" or higher. Introduction to Windows network forensics. Topics include: Windows network structure; Windows password/authentication mechanisms; Windows ports and services; Live-analysis techniques; Windows registry structure and evidence; Forensic analysis of events logs; Network forensics tools and reporting.

**CSC 548. Personal Electronic Device Forensics. (3 Credits)**

A. Prerequisite: CSC 332 with a grade of "C" or higher. Introduction to personal electronic device forensics. Topics include architecture, functionality, operating systems implementation of PEDs (cell phones, PDAs, iPod, MP3 music players, GPS devices), recovering evidence from PEDs, and hostile forensic and booby-trapping techniques.

**CSC 549. Computer Forensics Capstone. (3 Credits)**

A. Prerequisite: CSC 332 with a grade of "C" or higher. Project course. Students apply learned digital forensic knowledge, techniques, and software and hardware tools to work on a team project on a case for digital evidence collection, handling, analysis, and reporting.

**CSC 550. Graphics Programming. (3 Credits)**

A. Prerequisites: CSC 316 with a grade of "C" or higher. 3-D geometry, model transformation, matrices, computer algorithms and protocols, texture mapping, camera control, and collision detection.

**CSC 555. Topics in Multimedia: \_\_\_. (3 Credits)**

A. Prerequisite: departmental approval. For advanced students in computer science. Subject announced when offered. May be retaken to a maximum of six hours, provided that the topics are different.

**CSC 581. Machine Learning. (3 Credits)**

(3) A. Prerequisites: A grade of "C" or higher in CSC 210 or 310 and STA 270. Introduction to Machine Learning and its core models and algorithms. Hands-on R programming experiences of using machine learning/deep learning algorithms to analyze real-world data sets.

**CSC 582. Big Data. (3 Credits)**

(3) A. Prerequisites: A grade of "C" or higher in all CSC 310. Advanced cutting edge and state-of-the-arts knowledge and implementation in big data. Modern deep learning tools for analyzing real-world data sets.

**CSC 583. Data Visualization. (3 Credits)**

(3) A. Prerequisites: CSC 310. Principles and techniques for data visualization, including visual representation methods and techniques for increasing the understanding of complex data and models. Hands-on visual programming experiences in data collection and demonstration.

**Electricity/Electronics****EET 251. Electricity and Electronics. (3 Credits)**

I, II. Prerequisite: Grade of at least "C" in MAT 095 or a minimum math ACT score of 18 or a minimum SAT math score of 490. Principles of basic electricity, circuit operation, and electronics. Topics include electrical components, measurements, power, characteristics of AC-DC, basic circuit laws, circuit simulation, magnetism, energy conversion, and sources. 2 Lec/2 Lab.

**EET 252. Digital Electronics. (3 Credits)**

I, II. Prerequisite: grade of at least "C" in MAT 090 or equivalent. A survey of digital electronics fundamentals and applications. Topics include number systems, digital mathematics, logic families, logic gates, multiplexers, demultiplexers, comparators, counters, decoders, displays, and converters. 2 Lec/2 Lab.

**EET 253. Microprocessor Control Systems. (3 Credits)**

A. Prerequisite: EET 251 and 252. The operation and application of microprocessor-based control systems in electro-mechanical project environments. Topics include data, address, and control signals; memory software; interfacing digital and analog devices; ports; and data communications. 2 Lec/2 Lab.

**EET 254. Machine Language/Microcontrol. (3 Credits)**

A. Prerequisite/Corequisite: EET 252. Machine language programming for ROM based microprocessor based industrial controllers. Emphasis on software manipulation of I/O control devices in real-time, interrupt driven, process control environments. 2 Lec/2 Lab.

**EET 257. Electronic Devices and Circuits. (3 Credits)**

A. Prerequisite: EET 251. An analysis of the characteristics of solid state devices and the common circuits that utilize these devices. Emphasis on problem solving supplemented by laboratory activities and demonstration of electronic circuits and devices. 2 Lec/2 Lab.

**EET 349. Co-op or Appl Lrn: CET/CEN. (1-8 Credits)**

II. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies in Computer Electronics Technology (CET) or Computer Electronic Networking (CEN). Transfer students must have completed at least 12 hours of coursework at EKU. A minimum of 80 hours work required for each academic credit.

**EET 350. Industrial Electronics I. (3 Credits)**

A. Prerequisite: EET 257. Principles of timing, power control circuitry, transducers, and programmable controllers in commercial and industrial applications. 2 Lec/2 Lab.

**EET 351. Programmable Logic Controllers. (3 Credits)**

A. Prerequisite: EET 251 or 252. The study of programmable logic controllers (PLCs). PLC functioning theory, selection, wiring, and programming. 2 Lec/2 Lab.

**EET 452. Electrical Power & Drives. (3 Credits)**

A. Prerequisites: EET 257; MAT 120 or higher and PHY 101. Principles of electromagnetic induction as applied to the generation, distribution, conversion, control, and measurement of electrical power. Analysis of the electronics used for electrical drives. Installation, programming and maintenance of digital drives. 2 Lec/2 Lab.

## Informatics

### INF 101. Introduction to Online Learning. (1 Credit)

(1) A. Formerly CSC 101. Prepare students to take online courses at EKU including the use of the Blackboard learning environment. Help students acquire basic skills to be successful in online learning. Credit will not be awarded to students who have credit for CSC 101.

### INF 104. Computer Literacy with Software Applications. (3 Credits)

(3) A. Formerly: CSC 104. A non-technical survey of computer history, hardware, and software. Implications of the use and misuse of computers. The effect of computers on society. Software applications such as word processors, spread sheets, databases, and graphics. Credit will not be awarded to students who have credit for CSC 104. 3 Lec (1 lab when taught in large lecture sections).

### INF 105. Software Application Topics. (1-3 Credits)

(1-3) A. Formerly CSC 105. Selected topics in software applications. Topics vary with offering. May be retaken with advisor approval to a maximum of nine hours provided topics are different.

### INF 110. Introduction to the Internet. (1 Credit)

(1) I, II. Formerly CSC 110. Introduction to the internet and the Internet processing tools. The course emphasizes the use of the World Wide Web as an information broadcasting and retrieval tool. Credit will not be awarded to students who have credit for CSC 110.

### INF 120. Introduction to Multimedia. (3 Credits)

(3) I, II. Formerly CSC 120. Introduction to multimedia technology and computerized visual communication. Topics include video editing, media file processing, video streaming, computer graphics. Credit will not be awarded to students who have credit for CSC 120.

### INF 123. Exploring Virtual Worlds. (3 Credits)

(3) A. Formerly: CSC 123. Exploration of the technologies used in virtual environments and their effects on society. Review of technology driving virtual environments with historical context. Emerging technology. Social/economical consequences. Possible Future outcomes through new technologies and science fiction. Credit will not be awarded to students who have credit for CSC 123.

### INF 130. 3D Printing. (3 Credits)

A. Exploration of the technologies used in the 3D printing process. Development of skills needed to generate content for 3D printing. Software-driven solutions to 3D printing issues. Emerging technology, Social/Economic consequences. Credit will not be awarded to students who have credit for Special Topics course: 3D printing.

### INF 301. Current Topics in Informatics: \_\_\_\_\_. (3 Credits)

(3) A. Formerly CSC 301. Prerequisite: A grade of "C" or higher in INF 104, CIS 212, or or equivalent. Introduction to contemporary topics in informatics. May be retaken to a maximum of six hours provided the topics are different.

### INF 307. Cyberspace Security and Ethics. (3 Credits)

(3) A. Formerly CSC 307. Prerequisite: A grade of "C" or higher in ENG 102, ENG 105 (B), or HON 102. A non-technical survey of computing, including computers' effect on society, computer crime, viruses and other threats, and self-protection in an online environment. Credit will not be awarded to students who have credit for CSC 307.

### INF 314. MS Office & Data Analysis. (3 Credits)

(3) A. Formerly CSC 314. Prerequisite: "C" or higher in INF 104, CIS 212 or equivalent. Designing advanced Excel spreadsheets and Access databases to manage data problems with an emphasis on data calculations, data analysis, and organization of data.

### INF 318. Mobile Device Security & Privacy. (3 Credits)

(3) A. Formerly CSC 318. Prerequisite: A grade of "C" or higher in ENG 102, 105(B), or HON 102. Introductory course on mobile device security and privacy. Topics include mobile devices including smart phones, tablets and others; mobile device threats; mobile device security including planning and implementation; mobile device privacy. Credit will not be awarded to students who have credit for CSC 318.

### INF 321. Computer Forensics. (3 Credits)

(A). Formerly CSC 321. Prerequisite: A grade of "C" or higher in ENG 102, 105(B) or HON 102. Introductory course on computer forensics. Topics include computer forensics concept, digital evidence, law and regulations, computer forensics lab, computer forensic investigation, digital forensics report, court testimony, ethics and codes to expert witness. Credit will not be awarded to students who have credit for CSC 321.

### INF 322. Computer Forensics II. (3 Credits)

(A). Formerly CSC 322. Prerequisite: CSC 321 with a minimum grade of C, or INF 321 with a minimum grade of C. Introductory course on computer forensics. Topics include digital evidence, digital forensics investigation procedure, evidence identification, data acquisition, crime scene processing, digital forensic tools, quality assurance, evidence processing, investigation report, and court testimony. Credit will not be awarded to students who have credit for CSC 322.

### INF 330. 2D Animation. (3 Credits)

A. Prerequisite: A grade of "C" or higher in ART 100, BEM 240, INF 120, CSC 140, or TEC 190. Introduction to 2D animation for use in animation and games. Graphical tablets will be used to learn various digital drawing techniques and key-framing, onion-skinning, rigging will be used for animation generation leading to sprite-sheet assets. Credit will not be awarded to students who have credit for Special Topics course: 2D Animation.

### INF 391. Game Level Design for \_\_\_\_\_. (3 Credits)

(3) A. Prerequisite: a grade of "C" or higher in INF 130 or INF 330 or ART 100 or MUS 290. Introduction to game asset creation, texture painting, 3D modeling, 2D assets, visual programming, and level design. May be retaken to a maximum of 12 hours provided the covered game genres are different.

### INF 430. Digital Sculpting. (3 Credits)

A. Prerequisite: A grade of "C" or higher in ART 100, INF 130, INF 330, CSC 315. Navigate and utilize 3D sculpting tools. Create animation ready meshes and game ready models and textures. Learn appropriate terminology and vocabulary in the discussion of 3D assets. Credit will not be awarded to students who have credit for Special Topics course: Digital Sculpting.

### INF 495. Independent Work. (1-3 Credits)

Prerequisite: A grade of "C" or higher in ENG 102, 105 (B), or HON 102, and departmental approval. Directed study/research on a problem or area chosen in consultation with the instructor. Final paper required. Student must have the independent study proposal form approved by faculty supervisor and department chair prior to enrollment. May be retaken to a maximum of 12 hours.

### INF 507. Special Topics in Informatics: \_\_\_\_\_. (1-3 Credits)

(1-3) A. Prerequisite: Departmental approval. topics vary with offering. May be retaken to a maximum of six hours with advisor approval, provided the topics are different.

**INF 511. Principles of Game Design and Game Theory. (3 Credits)**

A. Fundamentals of designing both digital and non-digital games. In-depth study of the nature of "Fun," design philosophies, choice, motivation, flow theory, types of decisions, and reward in gameplay systems. Additional topics related to gamification, monetization, and serious games also covered.

**INF 512. Game Production and Publication. (3 Credits)**

A. Review of historical and current aspects of the games industry from AAA to indie. Industry operations, Employment, Founding your own studio, Funding, Freelancing, the Role of Influencers (Twitch, Youtube, social media), Platforms, IP protection.

**INF 513. Online Game and Application Design. (3 Credits)**

A. Introduction to the principles of design for online games applications. Topics include game balance, competition, cooperation, detecting exploits and cheating, security, privacy, social structures, administration, community management, online harassment, and client-server communication. Credit will not be awarded for both INF 513 and INF 713 .

**INF 515. Special Topics in Gaming:\_\_\_\_. (3 Credits)**

(3) A. Topics vary with offering. May be retaken to a maximum of six hours with advisor approval, provided the topics are different. Credit will not be awarded to students who have credit for INF 507: Special Topics in Informatics. Credit will not be awarded for both INF 515 and INF 715.

**INF 518. Principles of Cybersecurity. (3 Credits)**

A. Pre-requisite: A minimum grade of "C" in CSC 210 or CSC 310. This course discusses cybersecurity principles. Topics include security governance, risk assessment, security, people, information, and physical asset management; system development, access, and management; threat and incident management; business continuity; security monitoring and improvement.

## Networking

**NET 302. PC Troubleshooting & Construction. (3 Credits)**

I, II. Prerequisite: TEC 161 or (INF 104 or higher) or (CSC 140 or higher) or (CIS 212 or higher). Construction, operation and troubleshooting microprocessors, system memory, computer architecture, video types, monitors, hard drives, mice, cabling, notebook computers and printers modern operating systems, and application programs. Building computer systems to specific requirements. 2 Lec/2 Lab.

**NET 303. LANs & PC Communications. (3 Credits)**

I, II. Formerly EET 303. Prerequisite: TEC 161 or (INF 104 or higher) or (CSC 140 or higher) or (CIS 212 or higher) and (a grade of at least "C" in MAT 095 or a minimum math ACT score of 18 or a minimum SAT math score of 490). Installing, configuring, managing, and troubleshooting network and computer systems communications hardware and software. 2 Lec/2 Lab.

**NET 343. Network Switches & Routers. (3 Credits)**

A. Formerly EET 343. Prerequisite: NET 303 or EET 303 or CIS 375. Cisco internetworking, switching, IOS, routing, VLAN's, access lists, and WAN protocols are covered in a combination of lecture, demonstration, and laboratory. 2 Lec/2 Lab.

**NET 344. Advanced Network Devices. (3 Credits)**

A. Prerequisite: NET 343. Configure and troubleshoot network-aware devices/objects in small- to mid-sized LANs. Principles of network device/object startup, configuration and management, VLAN, advanced network communications and security. 2 Lec/2 Lab.

**NET 349. Applied Learning in NET. (0.5-8 Credits)**

I, II. Prerequisite: departmental approval, Sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors.

**NET 349A. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349B. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349C. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349D. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349E. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349F. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349G. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349H. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349I. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349J. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349K. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349L. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349M. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 349N. Cooperative Study: CET/CEN. (0.5-8 Credits)**

I, II. Formerly EET 349 A-N. Prerequisite: departmental approval, sophomore (30-59 hours) or higher standing and minimum of 2.0 GPA. Work under faculty and field supervisors in placements related to academic studies. 1-8 credit hours semester. Transfer students must have completed at least 12 hours of coursework at ECU. Minimum 80 hours work required per credit hour.

**NET 354. Microcomputer & Network Security. (3 Credits)**

I, II. Formerly EET 354. Prerequisite: NET 303 or EET 303 or CIS 375. Security considerations in computer systems and networks using appropriate hardware and software. Topics include malware, encryption, VPNs, ACLs, firewalls, Wi-Fi, and secure protocols. Testing configuring, managing and troubleshooting security in network systems. 2 Lec/2 Lab.

**NET 361. Cloud Technology Foundations. (3 Credits)**

A. Prerequisite: NET 303 or CIS 375. Cloud computing configurations and deployments. Definition, models, characteristics, testing, security, and management, business cases, and emerging technologies from the perspective of a cloud practitioner. Case studies of cloud computing across various industries. 2 Lec/2 Lab.

**NET 367A. Exit Exam for AAS in Tech, with Computer Electronics. (0 Credits)**

(0) A. Prerequisite: Consent of Advisor. Registration in NET 367A is required of all undergraduate A.A.S. students in the Technology program specializing in Computer Electronics program for the term in which they wish to take their comprehensive examination.

**NET 367B. Exit Exam for Minor in Computer Electronics Technology. (0 Credits)**

(0) A. Prerequisite: Consent of Advisor. Registration in NET 367B is required of all undergraduate students in the Minor for Computer Electronics Technology program for the term in which they wish to take their comprehensive examination.

**NET 367C. Exit Exam for University Certificate in Cyber Systems and Network Security. (0 Credits)**

A. Prerequisite: A minimum of 9 semester hours of NET courses completed, and EET 252. Registration in NET 367c is required of all students in the Cyber Systems and Network Security Technology university certificate, for the semester in which they wish to take their comprehensive exit examination.

**NET 385. Advanced Switches & Routers. (3 Credits)**

(3) A. Prerequisite: NET 343. Configure and troubleshoot small to mid-sized switched LANs. Principles of switch and router startup, configuration and management, VLAN, trunking, STP, advanced routing, WAN, scaling IP address space. Configure, apply and verify Access Control Lists. 2 Lec/2 Lab.

**NET 395. Special Topics in NET. (2-3 Credits)**

A. Formerly EET 395. Prerequisite: 30 credit hours or more completed, and (EET 252 or NET 303). Emerging technologies in the area of Network security and electronics (NET). May be retaken up to a maximum of 9 hours provided subject matter differs each time. Lec/Lab.

**NET 399. Associate Degree Capstone. (3 Credits)**

II. Formerly EET 399. Prerequisite: 30 credit hours or more completed, with a minimum of 9 semester hours of NET coursework completed, and a minimum of 6 semester hours of EET coursework completed. A project and research oriented course which serves as a capstone experience at the Associate Degree level. Design, implementation, analysis, and troubleshooting of electronic and computer technology related systems, and managing a technical.

**NET 403. Advanced LANSs and PC Communication. (3 Credits)**

A. Formerly EET 403. Prerequisite: NET 303 or EET 303 or CIS 375. This course will cover installation, configuration, troubleshooting and maintaining common server platforms. The participants will be given the opportunity to setup and manage network hardware, operating systems and applications. 2 Lec/2 Lab.

**NET 440. Wired/Wireless Communications. (3 Credits)**

A. Prerequisite: EET 257; MAT 112B or higher and PHY 101. Principles of communication over fiber and other wired/wireless media; digital and analog data transmission; modulation and multiplexing of data. Communication system components, safety, testing and troubleshooting. 2 Lec/2 Lab.



**NET 454. Wireless/WAN Security. (3 Credits)**

A. Prerequisites: ((NET 303 or CIS 375) and NET 354) or CSC 338.  
Security considerations in wireless and WANs. Wi-Fi, 802.11x, WPA, RADIUS, encryption, VPNs, VLANs, AAA authentication, Network Security Appliances, and secure protocols. Laboratory based configuration and security testing of WAPs, appliances and servers. 2 Lec/2 Lab.

**NET 467. Exit Exam for BS in NET. (0 Credits)**

(0) A. Prerequisite: Consent to advisor. Registration in NET 467 is required of all undergraduate B.S. (NET) students for the term in which they wish to take their comprehensive examination, including the exit exam and advisor approved certification or license.

**NET 499. Senior Capstone. (3 Credits)**

II. Formerly EET 499. Prerequisite: 90 credit hours or more completed, with a minimum of 18 semester hours of NET coursework completed, and a minimum of 9 semester hours of EET coursework completed, and AEM 310W. A project and research oriented course which serves as a capstone experience at the Bachelor Degree level. Design, implementation, analysis, and troubleshooting of networking, computers and electronics technology related systems, and managing a technical project.