Advanced Computer Science
Supplemental Program Resources

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Supplemental Program Resources 2024

Introduction

This document provides supplemental information for the Advanced Computer Science program of study. It may be updated or revised as the base program of study, or complementary programs, are updated, added, or removed. Please contact the appropriate Education Programs Professional with any questions.

The Program of Study includes the approved courses, complementary courses, alignment(s) to industry, postsecondary options, and additional information.

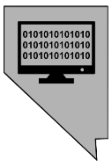
The Equipment List for the Advanced Computer Science program of study is included and, if applicable, additional items used only in the complementary course(s) are noted.

The Crosswalks and Alignments connect and support the Advanced Computer Science standards for the Information Technology program of study. Complementary course standards are not listed in the crosswalks and alignments.

Program of Study Information

The following program of study information sheet as well as the program structure tables for the courses are provided to be able to print separately for handouts. The information provided is based on the best available information at the time of this document and will be updated as appropriate.

Advanced Computer Science



The Advanced Computer Science program provides students a deeper exploration in the study of computer science and computational thinking to include algorithms and programming, computing systems, data and analysis, the impacts of computing, and networks and the internet. Topics introduced include abstraction, artificial intelligence, machine learning, the basics of cybersecurity, and object-oriented programming.

Information Technology Career Cluster

Information Technology® is focused on building linkages in information technology occupations for entry level, technical and professional careers related to the design, development, support and management of hardware, software, multimedia, and systems integration services.

Postsecondary Options

Certificate/License

- Computer Science Certificate of Achievement (CSN)

Associate Degrees

- Computer Science (TMCC. CSN, WNC)
- CIT-Software Programming (TMCC, CSN, WNC)
- Data Science (TMCC)

Bachelor's Degree

- Computer Science (UNLV, UNR)
- Data Science (NSC)
- Computer Science and Engineering (UNLV, UNR)

Master's/Doctoral Degree

- Computer Science (UNLV, UNR)

NEVADA Department of Education

Learning that works for America CTE®

For additional information on this cluster, please contact:
cteinfo@doe.nv.gov

Website: https://doe.nv.gov/offices/craleo/cte

Required Courses

Advanced Computer Science I
Advanced Computer Science II or AP CSA
Advanced Computer Science II Lab

Complementary Courses

Advanced Computer Science Advanced Studies
Software and App Development for Advanced Computer Science
CTE Work Experience – Information Technology
Industry Recognized Credential- Advanced Computer Science

Work-Based Learning Opportunities

Job Shadowing / Internship / CTE Work Experience/ School-based Enterprise/ Apprenticeship Ready Programs

Career and Technical Student Organization

FBLA Nevada FBLA SkillsUSA SkillsUSA NEVADA TSA NEVADA TSA TECHNOLOGY STUDENT ASSOCIATION

State Recognized Industry Certifications

Refer to the Governor's Office of Workforce Innovation's
Nevada Industry Recognized Credential List

Aligned to Industry			
Occupation	Median Wage Per year	Annual Openings	% Growth
Computer System Analyst	$99,270	44,500	9%
Software Developers	$109,200	162,900	25%
Database Administrators	$101,000	11,500	9%
Computer and Information Research	$131,490	3,300	21%
Data Scientists	$100,910	13,500	36%
Computer and Info Systems Managers	$159,010	48,500	16%

Source U.S. Bureau of Labor Statistics 2022

Program Structure for Advanced Computer Science

The core course sequencing is provided in the following table. Complementary Courses are available and provided later in this document. The following courses provide a completed program of study. The Lab is a complementary course available concurrently with the Advanced Computer Science II course.

Core Course Sequence (R) with Lab Course(s) (C)

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
R	Advanced Computer Science I	ADV COMPUTER SCIENCE I	11.0701	10	152	G	1.00	12	10152G1.0012
R	Advanced Computer Science II	ADV COMPUTER SCIENCE II	11.0701	10	152	G	1.00	22	10152G1.0022
R	OR AP Computer Science A	AP COMP SCI A	11.0701	10	157	G	1.00	22	10157G1.022
C	Advanced Computer Science II LAB	ADV COMPUTER SCIENCE II L	11.0701	10	152	E	1.00	22	10152E1.0022

The complementary courses are provided in the following table. **The qualifying program of study must be completed prior to enrolling in the complementary course(s)**. A program does not have to utilize the complementary courses for students to complete their program of study.

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
C	Advanced Computer Science Advanced Studies	ADV COMPUTER SCIENCE AS	11.0701	10	152	E	1.00	11	10152E1.0011
C	Software and App Development for Advanced Computer Science	APP DEV ADV COMP SCI	11.0205	10	160	E	1.00	11	10160E1.0011
C	Industry Recognized Credential – Advanced Computer Science	IRC ADV COMPUTER SCI	11.0701	10	999	E	1.00	11	10999E1.0011
C	CTE Work Experience – Information Technology	WORK EXPER IT	99.0011	10	298	G	1.00	11	10298G1.0011

CIP Code – Classification of Instructional Programs (CIP) Codes

SCED – School Courses for the Exchange of Data that populates the State Infinite Campus System and the System for Accountability Information in Nevada (SAIN)

Course Descriptions

Advanced Computer Science I

Prerequisite: None (successful completion of Computer Science Principles is recommended but not required)

This course will introduce students to the essential concepts of computer science and show how computing and technology can influence the world. This course focuses on using technology and programming to solve computational problems and find creative solutions that reduce bias and equity deficits. Topics include classic algorithmic design, control structures, decomposition, modularity, abstraction, hardware and software, data analysis, developing programs, and troubleshooting. The appropriate use of technology and industry-standard equipment is an integral part of this course.

Advanced Computer Science II (Option A)

Prerequisite: Advanced Computer Science I

This course is a continuation of Advanced Computer Science I. Topics to be explored include, advanced algorithms, conditional controls, recursion, the use of libraries, data collection and visualization tools, societal impacts of computing, basic networking and cloud computing, cybersecurity issues, and artificial intelligence. The students will continue to develop all skills learned in Advanced Computer Science I. The appropriate use of technology and industry-standard equipment is an integral part of this course. Upon successful completion of this course, students will have acquired entry-level skills for employment and be prepared for postsecondary education.

AP Computer Science A (Option B)

Prerequisite: Advanced Computer Science I

This course follows The College Board Advanced Placement (AP) curriculum and prepares students for the AP Computer Science exam. This course provides advanced computer science students with instruction in advanced topics that include problem solving, design strategies and methodologies, data structures, algorithms, analysis of potential solutions, and the ethical and social implications of computing. The course emphasizes both object-oriented and imperative problem solving and design. Students will learn to write, run, and debug solutions in the Java programming language, utilizing standard Java library classes. The appropriate use of technology and industry-standard equipment is an integral part of this course. Upon successful completion of this course, students will have acquired entry-level skills for employment and be prepared for postsecondary education.

Advanced Computer Science II LAB

Prerequisite: Concurrent enrollment in Advanced Computer Science II OR AP Computer Science A

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth lab experience that applies the processes, concepts, and principles as described in the classroom instruction. The coursework will encourage students to explore and develop advanced skills in their program area. The appropriate use of technology and industry-standard equipment is an integral part of this course.

Advanced Computer Science Advanced Studies

Prerequisite: Completion of Advanced Computer Science Program of Study

This course is offered to students who have completed all content standards in the Advanced Computer Science program of study and desire to pursue advanced study through investigation and in-depth research. Students are expected to work independently or in a team and consult with their supervising teacher for guidance. The supervising teacher will give directions, monitor, and evaluate the students' topic of study. Coursework may include various work-based learning experiences such as internships and job shadowing, involvement in a school-based enterprise, completion of a capstone project, and/or portfolio development. This course may be repeated for additional instruction and credit.

Software and App Development for Advanced Computer Science

Prerequisite: Completion of Advanced Computer Science Program of Study

This course is offered to students who have completed all content standards in the Advanced Computer Science program and desire to pursue advanced study through investigation and in-depth research. This course expands the learner's knowledge of algorithms. It explores Dev Net and API frameworks that are integral to application and software development.

Industry-Recognized Credential – Advanced Computer Science

Prerequisite: Completion of Advanced Computer Science Program of Study

This course is offered to students who have completed all content standards in a program of study and desire to pursue an Industry-Recognized Credential that aligns with the standards and skills associated with the Advanced Computer Science Program of Study. This course is designed to expand the students' opportunities to pursue certification aligned with employment standards in the industry aligned with this program of study. The supervising teacher will provide instruction aligned with the certification requirements, monitor progress toward certification, and provide the students with appropriate testing or certification opportunities associated with the intended Industry-Recognized Credential that is the subject of the course. This course may be repeated for additional instruction and credit.

CTE Work Experience – Information Technology

Prerequisite: Completion of Level 2 course in the qualifying program of study

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth CTE work experience that applies the processes, concepts, and principles as described in the classroom instruction. This course will encourage students to explore and develop advanced skills through work-based learning directly related to the program of study. The course must follow NAC 389.562, 389.564, 389.566 regulations.

Supplemental Program Resources 2024

Equipment List

This recommended list is based upon a classroom size of 25 students. All costs are estimated and may be adjusted once verified and justified by districts with current quotes. No specific equipment vendor or brand names are endorsed due to various possibilities, but school districts should consult with stakeholders to ensure industry-recognized equipment and software are purchased. The intent of this list is to provide school districts with guidance on the equipment needed to implement the state standards for an Advanced Computer Science program.

CTE Classroom Equipment Total: $1,430

QTY	ITEM DESCRIPTION	UNIT	TOTAL
2	Storage Cabinets (36” x 12” x 72”) (lockable)	$400	$800
1	Eyewash Station	$300	$300
1	Fire Extinguisher	$130	$130
1	Sink with Soap Dispenser	$100	$100
1	First Aid Kit	$100	$100

Program Equipment Total: $29,500

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Computers	$1,000	$25,000
1	Teacher Computer (enhanced memory/storage, download capable)	$2,500	$2,500
1	Technology Storage/Charging System	$2,000	$2,000
1	Networkable Laser Printer (black/white or color)	$1,000	$1,000

Instructional Materials Total: $3,000

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Textbooks Approved CTE Instructional Materials list can be found here.	$100	$2,500
1	Teacher Textbook Edition and Resources	$500	$500

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Instructional Supplies **Total: $9,725**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Programable Hardware (drone kits, robots, tiny CPU's etc.)	$300	$7,500
25	Flash Drives (50 GB)	$30	$750
25	Ethernet Cables	$15	$375
Varies	Computer Accessories	$600	$600
Varies	Consumable Supplies for Projects	$500	$500

Other **Total: $0**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
N/A	N/A	$0	$0

Category Totals:

Classroom Equipment	$1,430
Program Equipment	$29,500
Instructional Materials	$3,000
Instructional Supplies	$9,725
Other	$0
Estimated Program Total	**$44,655**

Crosswalks and Alignments for Program of Study Standards

Crosswalks and alignments are intended to assist the teacher make connections for students between the technical skills within the program and academic standards. The crosswalks and alignments are not intended to teach the academic standards but to assist students in making meaningful connections between their CTE program of study and academic courses. The crosswalks are for the required program of study courses, not the complementary courses.

Crosswalks (Academic Standards)

The crosswalks of the Advanced Computer Science Standards show connections with the Nevada Academic Content Standards. The crosswalk identifies the performance indicators in which the learning objectives in the Advanced Computer Science program connect with and support academic learning. The performance indicators are grouped according to their content standard and are crosswalked to the Nevada Academic Content Standards in English Language Arts, Mathematics, and Science.

Alignments (Mathematical Practices)

In addition to connections with the Nevada Academic Content Standards for Mathematics, many performance indicators support the Mathematical Practices. The following table illustrates the alignment of the Advanced Computer Science Standards Performance Indicators and the Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Advanced Computer Science program connect with and support academic learning.

Alignments (Science and Engineering Practices)

In addition to connections with the Nevada Academic Content Standards for Science, many performance indicators support the Science and Engineering Practices. The following table illustrates the alignment of the Advanced Computer Science Standards Performance Indicators and the Science and Engineering Practices. This alignment identifies the performance indicators in which the learning objectives in the Advanced Computer Science program connect with and support academic learning.

Crosswalks (Common Career Technical Core)

The crosswalks of the Advanced Computer Science Standards show connections with the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Advanced Computer Science program connect with and support the Common Career Technical Core. The Common Career Technical Core defines what students should know and be able to do after completing instruction in a program of study. The Advanced Computer Science Standards are crosswalked to the Information Technology Career Cluster™ and the Programming and Software Development Career Pathway.

Crosswalk of Advanced Computer Science Program of Study Standards and the Nevada Academic Content Standards

English Language Arts: Language Standards

Nevada Academic Content Standards		Performance Indicators
L.11-12.1b	Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage) as needed.	2.3.1
L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.	1.5.2

English Language Arts: Reading Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards		Performance Indicators
RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.	6.2.1
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.	2.4.1; 3.1.1
RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	4.2.3
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	2.5.2
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	5.1.5, 5.3.3; 6.1.1
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	2.3.3; 3.2.1

English Language Arts: Speaking and Listening Standards

Nevada Academic Content Standards		Performance Indicators
SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2, 1.5.2
SL.11-12.1b	Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.	5.2.1
SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2
SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2, 1.5.2

English Language Arts: Writing Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards		Performance Indicators
WHST.11-12.1	Write arguments focused on discipline-specific content.	2.2.1
WHST.11-12.1b	Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.	2.1.2, 2.5.6; 3.3.1
WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.	2.5.7; 5.1.4, 5.3.1, 5.3.2
WHST.11-12.2a	Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.	2.3.3
WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	1.2.5, 1.4.1

WHST.11-12.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	1.4.4; 2.1.1, 2.5.1
WHST.11-12.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	1.4.5; 6.1.2
WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	1.1.2, 1.1.3, 1.4.2, 1.4.3 1.5.2

Science HS: Engineering Design

Nevada Academic Content Standards		Performance Indicators
HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	6.1.1, 6.1.2, 6.2.2
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	2.1.1, 2.1.2, 2.4.1; 5.1.4 5.1.5; 6.1.2, 6.2.2
HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	2.2.3, 2.5.1, 2.5.6; 5.3.1 5.3.3; 6.2.3, 6.2.4
HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	2.4.3; 4.2.1

Science HS: Ecosystems – Interactions, Energy, and Dynamics

Nevada Academic Content Standards		Performance Indicators
HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	4.2.1
HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	4.2.1, 4.2.3

Science HS: Earth's Place in the Universe

Nevada Academic Content Standards		Performance Indicators
HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	4.2.3

Alignment of Advanced Computer Science Standards and the Mathematical Practices

Mathematical Practices	Advanced Computer Science Performance Indicators
1. Make sense of problems and persevere in solving them.	1.1.1, 1.1.2, 1.5.6, 1.5.10
2. Reason abstractly and quantitatively.	1.1.1, 1.1.2, 1.2.1, 1.2.3, 1.4.3 1.5.6, 1.5.10
3. Construct viable arguments and critique the reasoning of others.	1.2.1, 1.2.3, 1.3.3, 1.5.6, 1.5.8 2.3.1
4. Model with mathematics.	1.1.1, 1.1.2, 1.3.1, 1.3.3, 1.5.6 1.5.9, 1.5.10; 3.1.1, 3.2.1, 3.2.3, 3.3.1, 3.3.2; 4.1.2, 4.1.7
5. Use appropriate tools strategically.	1.3.1, 1.3.3; 3.1.1, 3.2.1 3.2.3 3.3.1, 3.3.2; 4.2.1
6. Attend to precision.	1.4.3, 1.5.8, 1.5.9
7. Look for and make use of structure.	1.1.1, 1.1.2, 1.3.1, 1.3.3 1.4.3 3.1.1; 4.1.3, 4.1.8
8. Look for and express regularity in repeated reasoning.	1.1.1, 1.1.2

Alignment of Advanced Computer Science Standards and the Science and Engineering Practices

Science and Engineering Practices	Advanced Computer Science Performance Indicators
1. Asking questions (for science) and defining problems (for engineering).	1.2.2, 1.5.1
2. Developing and using models.	2.1.1, 2.2.1, 2.2.2, 2.3.1, 2.3.2 3.1.1, 3.2.1, 3.3.1, 3.3.2; 4.1.2 4.1.7; 5.2.1, 5.2.5
3. Planning and carrying out investigations.	3.3.2; 4.1.2, 4.1.7
4. Analyzing and interpreting data.	3.1.1, 3.3.1, 3.3.2
5. Using mathematics and computational thinking.	1.5.4, 1.5.9; 3.3.1, 3.3.2
6. Constructing explanations (for science) and designing solutions (for engineering).	4.1.4, 4.3.1, 4.3.5
7. Engaging in argument from evidence.	1.2.3; 4.3.1, 4.3.3, 4.3.5
8. Obtaining, evaluating, and communicating information.	1.5.3, 1.5.4, 1.5.5, 1.5.8, 1.5.9 1.5.10; 2.1.1, 2.2.1, 2.2.2, 2.3.1 2.3.2; 3.1.2, 3.3.1, 3.3.2; 4.1.2 4.1.7, 4.2.1, 4.3.1, 4.3.5; 5.1.1 5.1.2

Crosswalks of Advanced Computer Science Standards and the Common Career Technical Core

Information Technology Career Cluster	Performance Indicators
1. Demonstrate effective professional communication skills and practices that enable positive customer relationships.	4.1.2
2. Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.	4.1.7
3. Demonstrate the use of cross-functional teams in achieving IT project goals.	1.5.4; 4.2.1, 4.2.2
4. Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.	1.5.7; 4.3.1, 4.3.2, 4.3.4
5. Explain the implications of IT on business development.	4.3.1, 4.3.5
6. Describe trends in emerging and evolving computer technologies and their influence on IT practices.	4.1.1
7. Perform standard computer backup and restore procedures to protect IT information.	2.2.1, 2.3.1
8. Recognize and analyze potential IT security threats to develop and maintain security requirements.	5.2.1, 5.2.2, 5.2.3, 5.2.4 5.2.5
9. Describe quality assurance practices and methods employed in producing and providing quality IT products and services.	1.5.12, 1.5.13
10. Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.	5.2.1, 5.2.3
11. Demonstrate knowledge of the hardware components associated with information systems.	5.1.2
12. Compare key functions and applications of software and determine maintenance strategies for computer systems.	2.3.1, 2.3.2

Programming and Software Development Career Pathway	Performance Indicators
1. Analyze customer software needs and requirements.	2.1.1, 5.1.2
2. Demonstrate the use of industry standard strategies and project planning to meet customer specifications.	4.1.2
3. Analyze system and software requirements to ensure maximum operating efficiency.	2.2.1, 2.2.2
4. Demonstrate the effective use of software development tools to develop software applications.	3.2.1
5. Apply an appropriate software development process to design a software application.	4.1.6
6. Program a computer application using the appropriate programming language.	1.5.6
7. Demonstrate software testing procedures to ensure quality products.	2.3.1, 2.3.2

8. Perform quality assurance tasks as part of the software development cycle.	3.2.2, 3.2.3, 3.3.2
9. Perform software maintenance and customer support functions.	2.3.1
10. Design, create, and maintain a database.	1.3.2, 1.4.2