

Computer Science I (CS1)

Course 2140

Credits 12.5

2018

I. Course Description:

Computer Science students work independently and in teams to develop computational thinking and solve problems. The course does not aim to teach mastery of a single programming language but aims instead to develop computational thinking, to generate interest in the field of Information Technology, and to introduce computational tools that develop creativity.

The course aims to build students' awareness of the tremendous demand for Information Technology specialists and for professionals in all fields who have computational skills. The course also aims to engage students to consider the present and future societal impact of Information Technology.

Throughout the program, students practice problem solving skills with activities that require them to develop planning, documentation, communication, and other professional skills. Students will gain a foundation for creativity, abstraction, algorithms and the global impact of computing. This will be done through the study of the Internet, Data and Programming. Students will be exposed to computer science professionalism through connecting computing, creating computational artifacts, abstracting, analyzing problems and artifacts, communicating and collaborating.

Database applications including data analysis, normalization and Structured Query Language will be delivered.

II. Curriculum Units:

Content Area:	Computer Science I	Grade(s)	9
Unit Plan Title:	Unit 1 – Computers and Computing		
	Students will learn about computer hardware and architecture, the language of computers – binary, Hexadecimal and ASCII. How information is encoded so that humans can understand it, and begin to explore the ways in which computers process information. I - Computers and Computing A - Computers and Computing (2 days)		

B -	How Computers Work	(1 day)
C -	Bits and Bytes	(3 days)
D -	Hardware	(1 day)
E -	Memory	(1 day)
F -	Binary and Hexadecimal	(2 day)
G -	ASCII	(1 day)
H -	Algorithms	(2 days)

13 days are required.

NJSLS/CCTC Standard(s) Addressed

- 9.3. IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3. IT.5 Explain the implications of IT on business development.
- 9.3 .IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3. IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- CRP1. Act as a responsible and contributing citizen and employee.
- CRP3. Attend to personal health and financial well-being.

Essential Questions (3-5)

- How and why is computer technology necessary?
- Are the ways in which digital information is encoded more laws of nature or are they man-made?
- What kinds of limitations does the binary encoding of information impose on what can be represented inside a computer?
- How accurately can human experience and perception be captured or reflected in digital information?

Anchor Text(s)

Blown To Bits, Your Life Liberty After the Digital Explosion. Hal Abelson, Ken Leeden and Harry Lewis, Copyright 2008.
ISBN-13: 978-0137135592

Short & Informational Texts (3-5)

ARTICLES

- “Google’s future plans for Android might be truly exciting”
<http://bgr.com/2017/02/16/google-andromeda-fuchsia-android/>
- “How To Make Alexa the Center of Your Smart Home”
<https://www.lifewire.com/make-alexa-run-your-smart-home-4129663>

Expected Proficiencies/Career and Life Skills

- Manage Binary Messages.
- Understand Number Systems and ASCII.
- Describe various career options within the information technology field.

Formative & Summative Assessments

Quizzes

Tests

Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :

Microsoft Office

Chrome Browser

YouTube

Internet

Adobe Creative Suite

Android Studio

App Inventor

Java

C++

Python

Microsoft Visual Studio

Apache Server

Swing

Scratch

Unity

Movie Maker

Animoto

OneNote

Cloud9

Albertio

AutoCad

TinkerCad

Java Bridge

'Processing' Java

Totally Operational Hardware required :

Operational Chromebook

Operational Workstation

Suggested Time Frame: 2 Weeks

Content Area:	Computer Science I	Grade(s)	9																								
Unit Plan Title:	Unit 2 – Building Blocks of Programming																										
	<p>Students will learn the fundamentals of computer programming, to permit them to begin to manipulate information and data and command a computer to do calculations they wish for it to perform. Students will expand upon their knowledge of the fundamentals of computer programming, and begin building abstractions of their own, understanding how to represent collections of data and write functions/methods/subroutines to allow their code to be more portable.</p> <p>II - Building Blocks of Programming</p> <table> <tr> <td>A - Pseudocode</td> <td>(1 day)</td> </tr> <tr> <td>B - Scratch</td> <td>(5 days)</td> </tr> <tr> <td>C - Python</td> <td>(4 days)</td> </tr> <tr> <td>D - Syntax, Variables and Data Types</td> <td>(3 days)</td> </tr> <tr> <td>E - Operators and Control Structures</td> <td>(2 days)</td> </tr> <tr> <td>F - Compiling</td> <td>(1 day)</td> </tr> <tr> <td>G - Functions</td> <td>(3 days)</td> </tr> <tr> <td>H- Arrays and Strings</td> <td>(3 days)</td> </tr> <tr> <td>I - Command-Line Interaction</td> <td>(1 day)</td> </tr> <tr> <td>J - Exit Codes</td> <td>(1 day)</td> </tr> <tr> <td>K - Libraries</td> <td>(1 day)</td> </tr> <tr> <td>L - Typecasting, Bugs and Debugging</td> <td>(2 days)</td> </tr> </table> <p>27 days are required.</p>			A - Pseudocode	(1 day)	B - Scratch	(5 days)	C - Python	(4 days)	D - Syntax, Variables and Data Types	(3 days)	E - Operators and Control Structures	(2 days)	F - Compiling	(1 day)	G - Functions	(3 days)	H- Arrays and Strings	(3 days)	I - Command-Line Interaction	(1 day)	J - Exit Codes	(1 day)	K - Libraries	(1 day)	L - Typecasting, Bugs and Debugging	(2 days)
A - Pseudocode	(1 day)																										
B - Scratch	(5 days)																										
C - Python	(4 days)																										
D - Syntax, Variables and Data Types	(3 days)																										
E - Operators and Control Structures	(2 days)																										
F - Compiling	(1 day)																										
G - Functions	(3 days)																										
H- Arrays and Strings	(3 days)																										
I - Command-Line Interaction	(1 day)																										
J - Exit Codes	(1 day)																										
K - Libraries	(1 day)																										
L - Typecasting, Bugs and Debugging	(2 days)																										
NJSLS/CCTC Standard(s) Addressed																											
<p>9.3. IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.</p> <p>9.3. IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.</p> <p>9.3 .IT-SUP.1 Provide technology support to maintain service.</p> <p>9.3 .IT-SUP.2 Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.</p> <p>CRP9. Model integrity, ethical leadership and effective management.</p>																											
Essential Questions (3-5)																											

How is designing an algorithm to solve a problem different from other kinds of problem solving?
What does it mean to be a “creative” programmer?
How do programmers collaborate?
How do you write programs to make decisions?
How do programs keep track of information?

Anchor Text(s)

5 Steps to a 5 AP Computer Science Principles (5 Steps to A 5 on the Advanced Placement Examinations) 1st Edition
Julia Schacht Sway, ISBN-13: 978-1260019995

Office of Educational Technology. (n.d.). Future Ready Librarians.

Retrieved September 22, 2016, from

http://1gu04j2l2i9n1b0wor2zmgua.wpengine.netdna-cdn.com/wp-content/uploads/2016/06/FR_Librarians

Purcell, K., Buchanan, J., & Friedrich, L. (2013). The Impact of Digital Tools on Student

Writing and How Writing is Taught in Schools. Retrieved September 22, 2016, from

<http://www.pewinternet.org/2013/07/16/the-impact-of-digital-tools-on-student-writing-and-how-writing-is-taught-in-schools/>

Short & Informational Texts (3-5)

www.pcmag.com (Current related article from PC Magazine)

www.adobe.com/inspire.html (Current related article from Adobe Magazine)

“Digital Citizenship is more important than ever.” www.iste.org/explore/articleDetail?articleid=535

www.pcmag.com (Current related article from PC Magazine)

www.adobe.com/inspire.html (Current related article from Adobe Magazine)

Expected Proficiencies/Career and Life Skills

Code Scratch.

Use programming control structures.

Code functions.

Create variables.

Code and implement arrays.

Describe data.

Code JavaScript, Python and the related syntax, IDE and programming control structures.

Formative & Summative Assessments

Quizzes

Tests

Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :

Microsoft Office
Chrome Browser
YouTube
Internet
Adobe Creative Suite
Android Studio
App Inventor
Java
C++
Python
Microsoft Visual Studio
Apache Server
Swing
Scratch
Unity
Movie Maker
Animoto
OneNote
Cloud9
Albertio
AutoCad
TinkerCad
Java Bridge
'Processing' Java

Totally Operational Hardware required :

Operational Chromebook
Operational Workstation

Suggested Time Frame: 4 Weeks

Content Area:	Computer Science I	Grade(s)	9
Unit Plan Title:	Unit 3 – Thinking Computationally		

Students begin to consider different algorithms and how they process information, appreciating the differences between algorithms and gaining the vocabulary necessary to speak on their relative merits and disadvantages. They will also be introduced to the concept of undecidability, the fact that computers are not capable of answering every question we ask them. As students begin to wrap up their introduction to C++, they are challenged to consider questions as to what makes a solution good, and what makes a program beautiful. In this chapter in particular, we challenge students to consider not just right and wrong, but how and why, discussing design trade-offs and why sometimes indeed the discipline of computer science boils down to determining what trade-off is appropriate under a given set of circumstances.

III - Thinking Computationally

- A - C++ (4 days)
- B - Search (3 days)
- C - Sort (3 days)
- D - Time Complexity (1 day)
- E - Unsolvable Problems (1 day)
- F - Simulation (1 day)
- G - Principles of Good Design (1 day)
- H - ncurses (1 day)
- I - Structures and Encapsulation (2 days)
- J - Recursion (2 days)
- K - File I/O (1 day)
- L - Images (3 days)
- M - Version Control (1 day)

24 days are required.

NJSLS/CCTC Standard(s) Addressed

9.3. IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
 CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Essential Questions (3-5)

How do you design a solution for a problem so that is programmable?
 Why is it necessary to sort data?
 Why is it necessary to be able to search data?

Anchor Text(s)

Crash Course AP Computer Science Principles, Jacqueline Corricelli, Research and Education Association
 ISBN : 978-0-7386-1234-8

Short & Informational Texts (3-5)

ARTICLES

Digital Marketing Institute. (2016) 10 Jobs That Didn't Exist 10 Years Ago. (n.d.).

Retrieved September 22, 2016, from <https://digitalmarketinginstitute.com/blog/10-jobs-didnt-exist-10-years-ago>

Ehmke, R. How Using Social Media Affects Teenagers | Child Mind Institute. (n.d.).

Retrieved September 22, 2016, from <http://childmind.org/article/teens-and-social-media/>

Knorr, C. (2016, September 21). Watch what you tweet: Social media can affect college admissions.

Retrieved September 22, 2016, from <http://www.cnn.com/2016/09/21/health/kids-social-media-college-admissions/index.html>

Expected Proficiencies/Career and Life Skills

Code, test and draw graphics.

Formative & Summative Assessments

Quizzes

Tests

Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :

Microsoft Office

Chrome Browser

YouTube

Internet

Adobe Creative Suite

Android Studio

App Inventor

Java

C++

Python

Microsoft Visual Studio

Apache Server

Swing

Scratch

Unity

Movie Maker

Animoto

OneNote

Cloud9

Albertio

AutoCad
 TinkerCad
 Java Bridge
 'Processing' Java
 Totally Operational Hardware required :
 Operational Chromebook
 Operational Workstation

Suggested Time Frame: 2-3 Weeks

Content Area:	Computer Science I	Grade(s)	9																																	
Unit Plan Title:	Unit 4 – Managing Data and Software Development																																			
	<p>Students learn about different ways of managing sets of data, both for sets that will rapidly and boundlessly grow, and also for easier subsequent indexing and searching.</p> <p>IV - Managing Data and Software Development</p> <table> <tr> <td>A -</td> <td>Dynamic Memory Allocation</td> <td>(5 days)</td> </tr> <tr> <td>B -</td> <td>Pointers</td> <td>(3 days)</td> </tr> <tr> <td>C -</td> <td>Valgrind</td> <td>(1 day)</td> </tr> <tr> <td>D -</td> <td>Trees</td> <td>(2 days)</td> </tr> <tr> <td>E -</td> <td>Tries</td> <td>(1 day)</td> </tr> <tr> <td>F -</td> <td>Hash Tables</td> <td>(2 days)</td> </tr> <tr> <td>G -</td> <td>Abstraction and API</td> <td>(2 days)</td> </tr> <tr> <td>H -</td> <td>Data Compression</td> <td>(2 days)</td> </tr> <tr> <td>I -</td> <td>Huffman Coding</td> <td>(1 day)</td> </tr> <tr> <td>J -</td> <td>Scalability</td> <td>(2 days)</td> </tr> <tr> <td>K -</td> <td>Collaboration</td> <td>(1 day)</td> </tr> </table> <p>22 days are required.</p>			A -	Dynamic Memory Allocation	(5 days)	B -	Pointers	(3 days)	C -	Valgrind	(1 day)	D -	Trees	(2 days)	E -	Tries	(1 day)	F -	Hash Tables	(2 days)	G -	Abstraction and API	(2 days)	H -	Data Compression	(2 days)	I -	Huffman Coding	(1 day)	J -	Scalability	(2 days)	K -	Collaboration	(1 day)
A -	Dynamic Memory Allocation	(5 days)																																		
B -	Pointers	(3 days)																																		
C -	Valgrind	(1 day)																																		
D -	Trees	(2 days)																																		
E -	Tries	(1 day)																																		
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G -	Abstraction and API	(2 days)																																		
H -	Data Compression	(2 days)																																		
I -	Huffman Coding	(1 day)																																		
J -	Scalability	(2 days)																																		
K -	Collaboration	(1 day)																																		
NJSLS/CCTC Standard(s) Addressed																																				
<p>9.3. IT-PRG.1 Analyze customer software needs and requirements.</p> <p>9.3. IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.</p> <p>9.3. IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.</p> <p>9.3. IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.</p> <p>CRP10. Plan education and career paths aligned to personal goals.</p>																																				

Essential Questions (3-5)

What opportunities do large data sets provide for solving problems and creating knowledge?
How is cybersecurity impacting the ever-increasing number of Internet users?
How does file compression work?

Anchor Text(s)

Computer Science Principles: The Foundational Concepts of Computer Science - For AP® Computer Science Principles 2nd ed.
Ed. Kevin Hare,
ISBN-13: 979-0692106715

Short & Informational Texts (3-5)

ARTICLES

Mancabelli, R., & Richardson, W. (2013). "Preparing students for the new world of work in the 21st century" [White paper].
Bright Bytes. Retrieved from http://pages.brightbytes.net/21stCenturyWork_pt1.htm

Expected Proficiencies/Career and Life Skills

Create, design, code and test a multi-page application.

Formative & Summative Assessments

Quizzes
Tests
Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :
Microsoft Office
Chrome Browser
YouTube
Internet
Adobe Creative Suite
Android Studio
App Inventor
Java
C++
Python
Microsoft Visual Studio

Apache Server

Swing

Scratch

Unity

Movie Maker

Animoto

OneNote

Cloud9

Albertio

AutoCad

TinkerCad

Java Bridge

'Processing' Java

Totally Operational Hardware required :

Operational Chromebook

Operational Workstation

Suggested Time Frame: 3 Weeks

Content Area:	Computer Science I	Grade(s)	9
Unit Plan Title:	Unit 5 – Networking and the Internet		
	<p>At this point in the course, we transition from programming in a mostly command-line environment to taking our applications to scale via the Internet. Students are introduced to the technologies underpinning this thing we know as “the Internet” before beginning to explore web programming by building simple pages of their own and making them accessible to the world via CS50 IDE.</p> <p>V - Networking and the Internet</p> <ul style="list-style-type: none">A - Internet Basics (1 day)B - IP Addresses (1 day)C - DNS and DHCP (1 day)D - Routers (1 day)E - TCP and IP (1 day)F - HTTP (1 day)G - Trust Models and Open Source (1 day)H - Cybersecurity (2 days)		

I - HTML (2 days)
J - CSS (2 days)
13 days are required.

NJSLS/CCTC Standard(s) Addressed

9.3 .IT.7 Perform standard computer backup and restore procedures to protect IT information.
9.3. IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
9.3. IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
9.3. IT-WD.1 Analyze customer requirements to design and develop a Web or digital communication product.
9.3. IT-WD.2 Apply the design and development process to produce user-focused Web and digital communications solutions.
9.3. IT-WD.5 Develop, administer and maintain Web applications.
CRP11. Use technology to enhance productivity.

Essential Questions (3-5)

What is a network?
What is HTML used for?
What is the purpose of a router?
What is the purpose of an IP Address?

Anchor Text(s)

Blown To Bits, Your Life Liberty After the Digital Explosion. Hal Abelson, Ken Leeden and Harry Lewis, Copyright 2008.
ISBN-13: 978-0137135592

Short & Informational Texts (3-5)

INFORMATIONAL TEXTS

JavaScript and Ajax, 2nd Edition, Comprehensive, Patrick Carey and Frank Canovatchel, Course Technology, 2010
ISBN – 13 978-1-4390-4403-2

HTML and CSS, 6th Edition, Comprehensive, Patrick Carey, Course Technology, 2012
ISBN - 13: 978-1-111-52644-3

HTML5 and CSS, 7th Edition, Comprehensive, Gary Shelly, Denise Woods and William Dorin, Course Technology, 2013
ISBN - 13: 978-1-1335-2614-8

ARTICLES

Anderson, M. (2015). 6 facts about Americans and their smartphones. Retrieved September 22, 2016, from <http://www.pewresearch.org/fact-tank/2015/04/01/6-facts-about-americans-and-their-smartphones/>

Lenhart, A. (2015). Teens, Social Media & Technology Overview 2015.

Retrieved September 22, 2016, from <http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/>

Lenhart, A. (2015). Teens, Technology and Friendships.

Retrieved September 22, 2016, from <http://www.pewinternet.org/2015/08/06/teens-technology-and-friendships/>

Lenhart, A. (2015). Chapter 5: Conflict, Friendships and Technology.

Retrieved September 22, 2016, from <http://www.pewinternet.org/2015/08/06/chapter-5-conflict-friendships-and-technology/>

“LAN WAN PAN MAN: Learn the Differences Between These Network Types”

<https://www.techopedia.com/2/29090/networks/lanwanman-an-overview-of-network-types>

Expected Proficiencies/Career and Life Skills

Describe what the Internet is, how it operates and the impact on society.

Describe Routers and IP Addresses.

Encrypt data and create encryption keys.

Send and receive encrypted messages.

Describe a programming event.

Formative & Summative Assessments

Quizzes

Tests

Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :

Microsoft Office

Chrome Browser

YouTube

Internet

Adobe Creative Suite

Android Studio

App Inventor

Java

C++

Python

Microsoft Visual Studio

Apache Server

Swing

Scratch

Unity

Movie Maker

Animoto

OneNote

Cloud9
 Albertio
 AutoCad
 TinkerCad
 Java Bridge
 'Processing' Java

Totally Operational Hardware required :
 Operational Chromebook
 Operational Workstation

Suggested Time Frame: 2 Weeks

Content Area:	Computer Science I	Grade(s)	9
Unit Plan Title:	Unit 6 – Problem Solving in an Interconnected World		
	<p>Students build upon their knowledge gained in the course to learn several new programming languages with abstractions built in that allow them to go far beyond what simply C++ and Scratch are able to do. They solve more complex problems that require processing large amounts of data and dealing with processes that scale, and see how these techniques can be applied to confront the challenges computer scientists will be contending with in the future. Students are introduced to Structured Query Language, App Inventor, and JavaScript.</p> <p>VI - Problem Solving in an Interconnected World</p> <ul style="list-style-type: none"> A - Python Programming (4 days) B - App Inventor (3 days) C - SQL (1 day) D - MVC (2 days) E - JavaScript (1 day) F - Ajax (1 day) G - Artificial Intelligence & Machine Learning (2 days) H - Virtual and Augmented Reality (2 days) <p>16 days are required.</p>		
NJSLS/CCTC Standard(s) Addressed			
9.3. IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.		

9.3 .IT-PRG.7 Demonstrate software testing procedures to ensure quality products.
CRP5. Consider the environmental, social and economic impacts of decisions.

Essential Questions (3-5)

What are the uses for Artificial Intelligence?
What are some benefits of using App Inventor?
What is the difference between SQL and Python?

Anchor Text(s)

Blown To Bits, Your Life Liberty After the Digital Explosion. Hal Abelson, Ken Leeden and Harry Lewis, Copyright 2008.
ISBN-13: 978-0137135592
Hello App Inventor. Paula Beer and Carl Simmons, Manning Publications Co. Copyright 2015.
ISBN-13: 978-1617291432

Short & Informational Texts

ARTICLES

Madden, M., Cortesi, S., Gasser, U., Lenhart, A., & Duggan, M. (2012, November 14). Parents, teens and Online Privacy (Rep.). Retrieved September 20, 2016, from Pew Internet : <http://www.pewinternet.org/2012/11/20/parents-teens-and-online-privacy/>

Expected Proficiencies/Career and Life Skills

Create, design, code, test algorithms.
Code Python and the syntax, IDE and programming control structures

Formative & Summative Assessments

Quizzes
Tests
Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :
Microsoft Office
Chrome Browser
YouTube
Internet
Adobe Creative Suite
Android Studio
App Inventor
Java

C++
 Python
 Microsoft Visual Studio
 Apache Server
 Swing
 Scratch
 Unity
 Movie Maker
 Animoto
 OneNote
 Cloud9
 Albertio
 AutoCad
 TinkerCad
 Java Bridge
 'Processing' Java

Totally Operational Hardware required :
 Operational Chromebook
 Operational Workstation

Suggested Time Frame: 2-3 Weeks

Content Area:	Computer Science I	Grade(s)	9
Unit Plan Title:	Unit 7 - End of Course Tasks		
	Students complete the through-course assessment Create—Applications from Ideas, Explore Assignment and exam preparation. VII - End of Course Tasks A - Explore Performance Task (8 days) B - Create Performance Task (12 days) C - Exam (5 days) 25 days are required.		

NJSLS/CCTC Standard(s) Addressed

9.3. IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3. IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3. IT-WD.3	Write product specifications that define the scope of work aligned to customer requirements.
9.3. IT-WD.4	Demonstrate the effective use of tools for digital communication production, development and project management.
9.3. IT-WD.6	Design, create and publish a digital communication product based on customer needs.
9.3. IT-WD.7	Evaluate the functionality of a digital communication product using industry accepted techniques and metrics.
9.3. IT-WD.8	Implement quality assurance processes to deliver quality digital communication products and services.
9.3. IT-PRG.5	Apply an appropriate software development process to design a software application.
CRP2.	Apply appropriate academic and technical skills.
CRP6.	Demonstrate creativity and innovation.
CRP7.	Employ valid and reliable research strategies.

Essential Questions (3-5)

- What are the requirements for a performance task?
- Why is one main difficulty in creating the topic for the Create Performance Task?
- Why is it necessary to have an effective formal exam?

Anchor Text(s)

Preparing for the AP Computer Science Principles Exam, Kathleen M. McLead, Tony Graham
ISBN 13: 9781337288828

Short & Informational Texts (3-5)**Expected Proficiencies/Career and Life Skills**

Develop skills to prepare for a performance test.

Formative & Summative Assessments

Final or performance test

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :
Microsoft Office
Chrome Browser
YouTube
Internet

Adobe Creative Suite
 Android Studio
 App Inventor
 Java
 C++
 Python
 Microsoft Visual Studio
 Apache Server
 Swing
 Scratch
 Unity
 Movie Maker
 Animoto
 OneNote
 Cloud9
 Albertio
 AutoCad
 TinkerCad
 Java Bridge
 'Processing' Java
 Totally Operational Hardware required :
 Operational Chromebook
 Operational Workstation

Suggested Time Frame: 3 Weeks

Content Area:	Computer Science I	Grade(s)	9
Unit Plan Title:	Unit 8 – Database Design and Programming		
	Students learn about different ways of managing sets of data, both for sets that will rapidly and boundlessly grow, and also for easier subsequent indexing and searching. Students are introduced to normalization and Entity Relationship Diagrams. Structured Query Language is completed. VIII- Database Design and Programming A - Data Analysis (6 days) B - SQL (14 days)		

20 days are required.

NJSLS/CCTC Standard(s) Addressed

9.3. IT-PRG.10 Design, create and maintain a database.
CRP12. Work productively in teams while using cultural global competence.

Essential Questions (3-5)

1. What is a database?
2. What is the purpose of removing redundant data?
3. What are current databases used for?

Anchor Text(s)

A Guide to SQL - 9th Edition, Philip J. Pratt and Mary Z. Last
ISBN-13: 9781111527273 Cengage
SQL Database Programming, Chris Fehily, Questing Vole Press
ISBN 13 : 9781937842314

Short & Informational Texts (3-5)

ARTICLES

Oracle Database 10g, A Beginners Guide, Ian Abramson, Michael Abbey and Michael Corey, McGraw Hill, 2004, ISBN - 0-07-223078-9
Current related article from Oracle Magazine [www.oraclejavamagazine-digital.com]

Expected Proficiencies/Career and Life Skills

Organize data into related areas and to eliminate redundant data.
Create entity relationship diagrams.
Describe a conceptual model and a physical model.
Design and code SQL queries.
Design and code SQL functions and Joins.
Describe big data.
Discuss security, privacy and personal issues of big data.
Store and manage big data.

Formative & Summative Assessments

Quizzes

Tests

Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :

Microsoft Office

Chrome Browser

YouTube

Internet

Adobe Creative Suite

Android Studio

App Inventor

Java

C++

Python

Microsoft Visual Studio

Apache Server

Swing

Scratch

Unity

Movie Maker

Animoto

OneNote

Cloud9

Albertio

AutoCad

TinkerCad

Java Bridge

'Processing' Java

Totally Operational Hardware required :

Operational Chromebook

Operational Workstation

Suggested Time Frame: 3 Weeks

Content Area:	Computer Science I	Grade(s)	9
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Unit Plan Title:	Unit 9 – Application Programming
	<p>In this fast-track chapter, students will complete their introduction to C++ and Java by diving into some of its most complex syntax, and implement strategies for data compression, abstractions, API development, and interfacing for web-traffic using C++ and Java.</p> <p>IX - Applications</p> <ul style="list-style-type: none"> A - Mobile Device Programming <ul style="list-style-type: none"> 1 - App Inventor (5 days) 2 - Android Studio (2 days) B - Programming Languages <ul style="list-style-type: none"> 1 - C++ (4 days) 2 - Java (4 days) <p>15 days are required.</p>
NJSLS/CCTC Standard(s) Addressed	
<p>9.3. IT-PRG.9 Perform software maintenance and customer support functions.</p> <p>9.3. IT-WD.9 Perform maintenance and customer support functions for digital communication products.</p> <p>9.3. IT-WD.10 Comply with intellectual property laws, copyright laws and ethical practices when creating Web/digital communications.</p> <p>9.3. IT-PRG.6 Program a computer application using the appropriate programming language.</p> <p>CRP4. Communicate clearly and effectively and with reason.</p>	
Essential Questions (3-5)	
<ol style="list-style-type: none"> 1. Why are databases more efficient than flat files? 2. How is a database managed? 3. What is the way to access data in a database? 4. What is the method used to eliminate redundant data? 	
Anchor Text(s)	
<p><u>Blown To Bits, Your Life Liberty After the Digital Explosion.</u> Hal Abelson, Ken Leeden and Harry Lewis, Copyright 2008. ISBN-13: 978-0137135592</p>	
Short & Informational Texts	
<p>INFORMATIONAL TEXT</p> <p>Android Application Development for Java Programmer, James C. Sheusi, Course Technology, 2013 ISBN-13 978-1-133-59354-6</p> <p>ARTICLE</p> <p>Anderson, M. (2015). How having smartphones (or not) shapes the way teens communicate. Retrieved September 22, 2016, from</p>	

<http://www.pewresearch.org/fact-tank/2015/08/20/how-having-smartphones-or-not-shapes-the-way-teens-communicate/>

Expected Proficiencies/Career and Life Skills

Code App Inventor, Android Studio and the syntax, IDE and programming control structures.
Code C++, JAVA and the syntax, IDE and programming control structures.

Formative & Summative Assessments

Quizzes
Tests
Lab Assignments

Resources (Websites, LMS, Google Classroom, documents, etc.)

Totally Operational Software required :

Microsoft Office
Chrome Browser
YouTube
Internet
Adobe Creative Suite
Android Studio
App Inventor
Java
C++
Python
Microsoft Visual Studio
Apache Server
Swing
Scratch
Unity
Movie Maker
Animoto
OneNote
Cloud9
Albertio
AutoCad
TinkerCad
Java Bridge
'Processing' Java

Totally Operational Hardware required :
Operational Chromebook
Operational Workstation

Suggested Time Frame: 2 Weeks

III. Instructional Strategies:

Lecture
Instructional videos
Instructional demonstrations
Practical Application
Hands-on assignments
Independent assignments
Participation
Technical and reflective writing

IV. Methods of Student Evaluation

Assessment in a career and technical area can be divided into three general categories—formal (graded), informal (ungraded), and practical application.

Formal Assessments:

Do-Now quizzes
Unit assignments
Participation
Lab application activities

Summative Assessments:

Test
Quiz
Information Technology vocabulary

Some of the informal assessments include, but are not limited to:

Daily closure discussion – At end of each activity, instructor and students discuss topic, provide insight and ask questions
Canvas Collaborations – Students frequently work in groups. Students exchange information and project data with group.

Practical application is an important component to this career and technical area. It demonstrates that a student can put the learned information into action by applying it in a real-world scenario.

V. Scope and Sequence:

I = Introduce D = Develop R = Reinforce M = Master	
Act as a responsible and contributing citizen and employee.	I D R M
Apply appropriate academic and technical skills.	I D R M
Attend to personal health and financial well-being.	I D R M
Communicate clearly and effectively and with reason.	I D R M
Consider the environmental, social and economic impacts of decisions.	I D R
Demonstrate creativity and innovation.	I D R
Employ valid and reliable research strategies.	I D R M
Utilize critical thinking to make sense of problems and persevere in solving them.	I D R M
Model integrity, ethical leadership and effective management.	I D R M
Plan education and career paths aligned to personal goals.	I D R
Demonstrate effective professional communication skills and practices that enable positive customer relations.	I D R M
Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.	I D R M
Demonstrate the use of cross-functional teams in achieving IT project goals.	I D R M
Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.	I D R M
Explain the implications of IT on business development.	I D R M
Describe trends in emerging and evolving computer technologies and their influence on IT practices.	I D R M

Perform standard computer backup and restore procedures to protect IT information.	I D R M
Recognize and analyze potential IT security threats to develop and maintain security requirements.	I D R
Describe quality assurance practices and methods employed in producing and providing quality and IT products and services.	I D R
Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.	I D R
Demonstrate knowledge of the hardware components associated with information systems.	I D R M
Compare key functions and applications of software and determine maintenance strategies for computer systems.	I D R M
Employ technical writing and documentation skills in support of an information system.	I D R
Apply quality assurance processes to maximize information system operation.	I D R
Analyze customer software needs and requirements.	I D R M
Demonstrate the use of industry standard strategies and project planning to meet customer specifications.	I D R M
Analyze system and software requirements to ensure maximum operating efficiency.	I D R M
Demonstrate the effective use of software development tools to develop software applications.	I D R
Apply an appropriate software development process to design a software application.	I D R M
Program a computer application using the appropriate programming language.	I D R M
Demonstrate software testing procedures to ensure quality products.	I D R M
Perform quality assurance tasks as part of the software development cycle.	I D R
Perform software maintenance and customer support functions.	I D R
Design, create and maintain a database.	I D R M
Analyze customer requirements to design and develop a Web or digital communication product.	I D R M
Apply the design and development process to produce user-focused Web and digital communications solutions.	I D R M
Write product specifications that define the scope of work aligned to customer requirements.	I D R M
Demonstrate the effective use of tools for digital communication production, development and project management.	I D R M
Develop, administer and maintain Web applications.	I D R M

Design, create and publish a digital communication product based on customer needs.	I D R M
Evaluate the functionality of a digital communication product using industry accepted techniques and metrics.	I D R M
Implement quality assurance processes to deliver quality digital communication products and services.	I D R M
Perform maintenance and customer support functions for digital communication products.	I D R M
Comply with intellectual property laws, copyright laws and ethical practices when creating Web/digital communications.	I D R

VI. Course Textbooks, Instructional Resources & Software:

Student Resources	Teacher Resources
<p>Print/E-Book</p> <p><u>Blown To Bits, Your Life Liberty After the Digital Explosion.</u> Copyright 2008. Hal Abelson, Ken Leeden and Harry Lewis, ISBN-13: 978-0137135592</p> <p><u>Preparing for the AP Computer Science Principles Exam</u> Kathleen M. McLead and Tony Graham ISBN 13 : 9781337288828 Publisher : Cengage Learning 2017</p> <p><u>5 Steps to a 5 AP Computer Science Principles</u> Julie Sway ISBN 13 : 9781260019995 McGraw Hill</p> <p><u>AP Computer Science Principles Crash Course</u> Jacqueline Corricelli ISBN 13 : 9780738612348 Research Education Association</p>	<p>Print/E-Book</p> <p><u>Blown To Bits, Your Life Liberty After the Digital Explosion.</u> Copyright 2008. Hal Abelson, Ken Leeden and Harry Lewis, ISBN-13: 978-0137135592</p> <p><u>Preparing for the AP Computer Science Principles Exam</u> Kathleen M. McLead and Tony Graham ISBN 13 : 9781337288828 Publisher : Cengage Learning 2017</p> <p><u>5 Steps to a 5 AP Computer Science Principles</u> Julie Sway ISBN 13 : 9781260019995 McGraw Hill</p> <p><u>AP Computer Science Principles Crash Course</u> Jacqueline Corricelli ISBN 13 : 9780738612348 Research Education Association</p>

<p><u>A Guide to SQL - 9th Edition</u> Philip J. Pratt and Mary Z. Last ISBN-13: 9781111527273 Cengage</p> <p><u>SQL Database Programming</u> Chris Fehily ISBN 13 : 9781937842314 Questing Vole Press</p> <p><u>Hello App Inventor.</u> Paula Beer and Carl Simmons, 2015. ISBN-13: 978-1617291432 Manning Publications Co. Copyright</p>	<p><u>A Guide to SQL - 9th Edition</u> Philip J. Pratt and Mary Z. Last ISBN-13: 9781111527273 Cengage</p> <p><u>SQL Database Programming</u> Chris Fehily ISBN 13 : 9781937842314 Questing Vole Press</p> <p><u>Hello App Inventor.</u> Paula Beer and Carl Simmons, 2015. ISBN-13: 978-1617291432 Manning Publications Co. Copyright</p>
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VII. Student Handout:

Computer Science students work independently and in teams to develop computational thinking and solve problems. The course does not aim to teach mastery of a single programming language but aims instead to develop computational thinking, to generate interest in the field of Information Technology, and to introduce computational tools that develop creativity.

The course aims to build students' awareness of the tremendous demand for Information Technology specialists and for professionals in all fields who have computational skills. The course also aims to engage students to consider the present and future societal impact of Information Technology.

Throughout the program, students practice problem solving skills with activities that require them to develop planning, documentation, communication, and other professional skills. Students will gain a foundation for creativity, abstraction, algorithms and the global impact of computing. This will be done through the study of the Internet, Data and Programming. Students will be exposed to computer science professionalism through connecting computing, creating computational artifacts, abstracting, analyzing problems and artifacts, communicating and collaborating.

Database applications including data analysis, normalization and Structured Query Language will be delivered.

PROFICIENCIES:

- Demonstrate how to work safely in professional environment.
- Use resources to examine trends, certifications, and careers in Information Technology.
- Demonstrate computer literacy skills.
- Manage Binary Messages.
- Understand Number Systems and ASCII.
- Describe various career options within the information technology field.
- Code Scratch.
- Use programming control structures.
- Code functions.
- Create variables.
- Code and implement arrays.
- Describe data.
- Code JavaScript, Python and the related syntax, IDE and programming control structures.
- Code, test and draw graphics
- Create, design, code and test a multi-page application
- Describe what the Internet is, how it operates and the impact on society.
- Describe Routers and IP Addresses.
- Encrypt data and create encryption keys.
- Send and receive encrypted messages.
- Describe a programming event
- Create, design, code, test algorithms.
- Code Python and the syntax, IDE and programming control structures
- Organize data into related areas and to eliminate redundant data.
- Create entity relationship diagrams.
- Describe a conceptual model and a physical model.
- Design and code SQL queries.

Design and code SQL functions and Joins.

Describe big data.

Discuss security, privacy and personal issues of big data.

Store and manage big data