Introduction to Coding

Course # 0436

Credits 5

2019

I. Course Description:

Introduction to Coding is a one period – full year elective offered to students who are not in Computer Science. The course provides a foundation to students who desire entry level programming skills.

The course aims to build students' awareness of the tremendous demand for Information Technology specialists and for professionals in all fields that possesses software development skills. The course also aims to engage students to consider the present and future impact of Information Technology.

Students work independently to develop computational thinking and problems solving skills. The course does not teach mastery of a single programming language but aims instead to provide a foundation to several current applications programming languages.

Throughout the program, students practice problem solving skills with activities that require them to develop, test and implement programs using current popular programming languages. Students will gain a foundation for creativity, abstraction, and algorithm development.

Various Information topics will be explored such as Computer Number Systems, Hardware and Software, Big Data, Cloud Computing and, Data Mining.

II. Units:

Content Area:	Introduction to Coding	Grade(s)	9-12
Unit Plan Title:	**Unit 1 – Introduction to Information Technology / Software** This unit introduces students to the environment of Information Technology and the Internet. It presents the introduction of digital technology and how it relates to everyday life. This unit introduces the foundational concepts of computer programming. The unit presents overall aspects of the rich Information Technology environment we live in. The unit explores various standard programming operators and programming structures used throughout the world of software design. Computer Number Systems are introduced. Various career opportunities are explored. I. Understanding Computer Technology A. Basic Information Technology 1. Hardware 2. Software 3. Storage 4. Memory B. The Internet C. Programming Logic 1. Pseudocode 2. Control Structures 3. Flowcharts 4. Program Development Cycle D. Operators 1. Variables 2. Assignment 3. Arithmetic 4. Relational 5. Logical		

	E. Number Systems F. IT Career Opportunities

NJSLS/CCTC Standard(s) Addressed

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
9.3. IT.12 Demonstrate knowledge of the hardware components associated with information systems.

Essential Questions (3-5)

What is Information Technology?
How do we use Information Technology?
What are the various operators used in programming?

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:

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

Expected Proficiencies/Career and Life Skills

Describe how the world of Information Technology impacts society.
Describe the 3 programming control structures.
Understand Number Systems and ASCII.

Formative & Summative Assessments

Quizzes
Tests

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

Microsoft Office

Internet - including access to all websites Microsoft Visual Studio 2017	
Suggested Time Frame:	**5 weeks**

Content Area:	**Introduction to Coding**	**Grade(s)**	**9-12**
Unit Plan Title:	**Unit 2 – Alice Programming** This unit introduces students to Alice Programming. Alice uses a drop and Drag solution to programing. 2D and 3D models are used, and animation concepts are delivered. I. Alice Programming A. Introduction to Alice B. Alice Development Environment C. Syntax D. Coding		

NJSLS/CCTC Standard(s) Addressed

CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.
9.3.IT-PRG.9 Perform software maintenance and customer support functions.

Essential Questions (3-5)

What is different about the Alice development environment?
What types of applications can be developed using Alice?
How is Alice different from other applications languages?

Anchor Text(s)

Learning to Program with Alice. Wanda P. Dann, Stephen Cooper, Randy Pausch, Prentice Hall, Copyright 2012.
ISBN – 13: 978-0-13-212247-4

Short & Informational Texts (3-5)

ARTICLES:

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/

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

Describe the Alice programming environment.
Create, design, code and test an Alice application.
Create animation.

Formative & Summative Assessments

Quiz
Test

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

Internet - including access to all websites
Alice Development Environment

Suggested Time Frame:	**6 weeks**

Content Area:	**Introduction to Coding**	**Grade(s)**	**9-12**
Unit Plan Title:	**Unit 3 – C++ Programming** Unit 3 – This unit introduces the foundational concepts of C++ programming, which unlocks the ability to make business and scientific applications that are used worldwide every day. C++ programming syntax and C++ datatypes are presented. C++ programs are developed based on specifications. II. C++ A. C++ Syntax B. C++ Datatypes		

	C. C++ Coding

NJSLS/CCTC Standard(s) Addressed

CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
9.3.IT-PRG.1 Analyze customer software needs and requirements.
9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.

Essential Questions (3-5)

How do you design a solution for a problem so that is programmable?
Why do we need algorithms?
How do you write programs to make logical decisions?

Anchor Text(s)

Programming Logic and Design Comprehensive. Joyce Farrell, Cengage Learning, Copyright 2006, ISBN-13: 978-1-285-77671-2

C++ Programs to Accompany – Programming Logic and Design, JoAnn Smith, Cengage Learning Copyright 2006, ISBN - 978-1-285-86741-0

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)
Anderson, M. (2015). 6 facts about Americans and their smartphones.

Expected Proficiencies/Career and Life Skills

Design and code a C++ program.
Describe C++ datatypes.
Identify various C++ libraries.

Formative & Summative Assessments

Quiz
Test
Project

Resources (Websites, LMS, Google Classroom, documents, etc.)	
Internet - including access to all websites MS Visual Studio 2017	
Suggested Time Frame:	**6 weeks**

Content Area:	Introduction to Coding	Grade(s)	9-12
Unit Plan Title:	**Unit 4 – Java Programming** Unit 4 – This unit introduces the student to Java programming. This popular language is used to develop typical Internet related applications that are used worldwide every day. Java programming syntax and Java datatypes are presented. Java programs are developed based on specifications. I. Java A. Java Syntax B. Java Datatypes C. Java Coding		

NJSLS/CCTC Standard(s) Addressed

CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.
9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.

Essential Questions (3-5)

What does a programmer need to know about internet applications?
How do programmers collaborate?
What types of applications can be built using Java?

Anchor Text(s)

Programming Logic and Design Comprehensive. Joyce Farrell, Cengage Learning, Copyright 2006,
ISBN-13: 978 - 1-285-77671-2

Short & Informational Texts (3-5)
INFORMATIONAL TEXTS: Java Programming – Making the Move from C++., Joe Wigglesworth and Paula Lumby, Course Technology, 1999 ISBN – 10 1-85032-922-2
Expected Proficiencies/Career and Life Skills
Describe Java Programming. Create, design, code, test Java based algorithms. Code, test and implement iteration using Java.
Formative & Summative Assessments
Quiz Test
Resources (Websites, LMS, Google Classroom, documents, etc.)
Internet - including access to all websites MS Office

Suggested Time Frame:	**6 weeks**

Content Area:	**Introduction to Coding**	**Grade(s)**	**9-12**
Unit Plan Title:	**Unit 5 – Python Programming** Unit 5 - This unit introduces the student to Python programming. This popular language is used to develop typical business, scientific and academic applications that are used worldwide. Python programming syntax and Python datatypes are presented. Python programs are developed based on specifications. I. Python A. Python Syntax B. Python Datatypes C. Python Coding		

NJSLS/CCTC Standard(s) Addressed

CRP9. Model integrity, ethical leadership and effective management.
CRP1 Plan education and career paths aligned to personal goals.
9.3. IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT-PRG.6 Program a computer application using the appropriate programming language.
9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.

Essential Questions (3-5)

How is designing an algorithm to solve a problem different from other kinds of problem solving?
How creative is programming?
Where are Python application programs used?

Anchor Text(s)

Fundamentals of Python First Programs. 2nd Edition. Kenneth A. Lambert, Cengage Learning, Copyright 2012, ISBN-13: 978 - 1 – 337 – 56009 -2

Short & Informational Texts (3-5)

ARTICLES:

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/

Expected Proficiencies/Career and Life Skills

Design and code a Python program.
Describe Python datatypes.
Identify Python specific syntax.

Formative & Summative Assessments

Quiz

Test
Resources (Websites, LMS, Google Classroom, documents, etc.)
Microsoft Office Internet - including access to all websites

Suggested Time Frame:	**6 weeks**

Content Area:	**Introduction to Coding**	**Grade(s)**	**9-12**
Unit Plan Title:	**Unit 6 – Additional Information Technology Topics** Unit 6 - This unit continues the introduction of software design. Data and database applications are introduced to students. App Inventor is introduced. Big Data and Data Mining are investigated. Visual Basic, as a user interface program, is introduced. This presents students with a foundation for the capabilities and power of software and data management through the world. I. Additional Information Technology Topics A. App Inventor B. Future Applications C. Cloud		

NJSLS/CCTC Standard(s) Addressed	
CRP12.	Work productively in teams while using cultural global competence.
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.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.
9.3. IT-SUP.9	Employ technical writing and documentation skills in support of an information system.

Essential Questions (3-5)

What opportunities do large data sets provide for solving problems and creating knowledge?
What advantages and disadvantages are presented with Cloud computing?
What is the power of Data Mining?

Anchor Text(s)

Android App Inventor for the Absolute Beginner. Dr. Lakshmi Prayaga, Jeffrey Hawthorne, Alex Whiteside. Cengage Learning, Copyright 2014,
ISBN-13: 978 – 1 – 285 – 73333 – 3

Short & Informational Texts (3-5)

ARTICLES:

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/
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

Describe Big Data.
Discuss security, privacy and personal issues of Big Data.
Discuss Cloud computing.

Formative & Summative Assessments

Quiz
Test

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

Microsoft Office
Internet - including access to all websites

Suggested Time Frame:	**6 weeks**

III. Instructional Strategies:

Lecture
Instructional videos
Instructional demonstrations

IV. Methods of Student Evaluation:

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

Formal Assessments:

Do-Now quizzes
Unit assignments or activities
Tests

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

Daily closure discussion – At the end of each activity, the instructor and students discuss topics, provide insight & ask questions

Practical application is an important component to this academic component. 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
Apply appropriate academic and technical skills.	I
Consider the environmental, social and economic impacts of decisions.	I
Demonstrate creativity and innovation.	I
Employ valid and reliable research strategies.	I
Utilize critical thinking to make sense of problems and persevere in solving	I

them.	
Model integrity, ethical leadership and effective management.	I
Plan education and career paths aligned to personal goals.	I
Demonstrate effective professional communication skills and practices that enable positive customer relations.	I
Explain the implications of IT on business development.	I
Describe trends in emerging and evolving computer technologies and their influence on IT practices.	I
Demonstrate knowledge of the hardware components associated with information systems.	I
Compare key functions and applications of software and determine maintenance strategies for computer systems.	I
Employ technical writing and documentation skills in support of an information system.	I
Analyze customer software needs and requirements.	I
Demonstrate the use of industry standard strategies and project planning to meet customer specifications.	I
Analyze system and software requirements to ensure maximum operating efficiency.	I
Demonstrate the effective use of software development tools to develop software applications.	I
Apply an appropriate software development process to design a software application.	I
Program a computer application using the appropriate programming language.	I
Demonstrate software testing procedures to ensure quality products.	I
Perform quality assurance tasks as part of the software development cycle.	I
Perform software maintenance and customer support functions customer support functions.	I

VI. Course Textbooks, Instructional Resources & Software:

Student Resources	Teacher Resources
Print/E-Book	**Print/E-Book**

Blown to Bits, Your Life Liberty After the Digital Explosion. Copyright 2008. Hal Abelson, Ken Leeden and Harry Lewis, ISBN-13: 978-0137135592 Programming Logic and Design Comprehensive. Joyce Farrell, Cengage Learning, Copyright 2006, ISBN-13: 978-1-285-77671-2 C++ Programs to Accompany – Programming Logic and Design, JoAnn Smith, Cengage Learning Copyright 2006, ISBN - 978-1-285-86741-0 Android App Inventor for the Absolute Beginner. Dr. Lakshmi Prayaga, Jeffrey Hawthorne, Alex Whiteside. Cengage Learning, Copyright 2014, ISBN-13: 978 – 1 – 285 – 73333 – 3 Fundamentals of Python First Programs. 2nd Edition. Kenneth A. Lambert, Cengage Learning, Copyright 2012, ISBN-13: 978 - 1 – 337 – 56009 -2	Blown to Bits, Your Life Liberty After the Digital Explosion. Copyright 2008. Hal Abelson, Ken Leeden and Harry Lewis, ISBN-13: 978-0137135592 Programming Logic and Design Comprehensive. Joyce Farrell, Cengage Learning, Copyright 2006, ISBN-13: 978-1-285-77671-2 C++ Programs to Accompany – Programming Logic and Design, JoAnn Smith, Cengage Learning Copyright 2006, ISBN - 978-1-285-86741-0 Android App Inventor for the Absolute Beginner. Dr. Lakshmi Prayaga, Jeffrey Hawthorne, Alex Whiteside. Cengage Learning, Copyright 2014, ISBN-13: 978 – 1 – 285 – 73333 – 3 Fundamentals of Python First Programs. 2nd Edition. Kenneth A. Lambert, Cengage Learning, Copyright 2012, ISBN-13: 978 - 1 – 337 – 56009 -2

VII. Student Handout:

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The course aims to build students' awareness of the tremendous demand for Information Technology specialists and for professionals in any field who possesses software development skills. The course also aims to engage students to consider the present and future impact of Information Technology.

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Throughout the program, students practice problem solving skills with activities that require them to develop, test and implement programs using current popular programming languages. Students will gain a foundation for creativity, abstraction, and algorithm development.

Various Information topics will be explored such as Computer Number Systems, Hardware and Software, Big Data, Cloud Computing and, Data Mining.

PROFICIENCIES:

Demonstrate how to work safely in professional environment.
Use resources to examine trends, certifications, and careers in Information Technology.
Demonstrate computer literacy skills and Programming Skills.
Describe how the world of Information Technology impacts society.
Describe the 3 programming control structures.
Understand Number Systems and ASCII.
Describe the Alice programming environment.
Create, design, code and test an Alice application.
Create animation
Design and code a C++ program.
Describe C++ datatypes.
Identify various C++ libraries n
Describe Java Programming.
Create, design, code, test Java based algorithms.
Code, test and implement iteration using Java.
Describe Big Data.
Discuss security, privacy and personal issues of Big Data.
Discuss Cloud computing.