COMPUTER SCIENCE COURSE OUTLINE

Grade	*Course*
7	Introduction to Computer Essentials (focus on Applications) Part 1
8	Computer Applications Part 2- Computer Integration
11/12	Advanced Computer Applications
10/11/12	Introduction to Computer Programming I/II
11/12	AP Computer Science (Preparation for AP Exam)

COMPUTER SCIENCE CURRICULUM

Grade 7

Course:
Introduction to Computer Essentials (focus on Applications)

Course Goals:
Begin the process of becoming Technology Literate: "the ability of an individual, working independently and with others, to responsibly, appropriately and effectively use technology tools to access, manage, integrate, evaluate, create and communicate information."

Major Topics:
By end of class year, through hands-on lab work and class lecture, the student will have gained basic keyboarding and computer application skills: word processing, spreadsheets, presentations, desktop publishing and internet research.

Text:
- Handouts from various texts.
- Introduction to Telecommunications
  MCI Telecommunications training manual authored by Laurie Cohen

Software:
- Microsoft Office 2007
- Keyboarding Software: Students have a choice—Mavis Beacon Teaches Typing, version 17; Microtype 4.0; DanceMat Typing (http://www.bbc.co.uk/schools/typing/); Addictive Typing Lessons (available as a free download/add-on to Firefox).

Skills Taught:
- Effective research techniques – including rules of plagiarism
- Keyboarding (touch typing). Goal = 20 words per minute with no more than 3 errors. Emphasis on accuracy and familiarity and comfort with the keyboard.
- Windows XP - File Management, saving files properly.
- Word Processing (Microsoft Word) – Research/Term paper preparation: (page numbers, title page, bibliography, headers, use of spell-check and thesaurus); Proper Business correspondence elements—their placement, margins, etc.; and Creating a two-column newsletter including multiple fonts, clipart, WordArt, bullets, borders and shading.
- Visual Presentations Software (Microsoft PowerPoint) – develop multimedia presentation to include bullets, clipart, transitions, creative animations, and Action Buttons. Effective presentation techniques will also be emphasized.
- Spreadsheets (Microsoft Excel) – creating a spreadsheet, entering data, use of formulas, functions, and graphing.

Either or both of the following may be included:
- Desktop Publishing (Microsoft Publisher) – students will be introduced to various templates to create simple projects; such as greeting cards and banners.
- HTML – students will be introduced to the concept of source code for internet web pages, specifically html tags. Students will develop a basic webpage using simple html tags.

COMPUTER SCIENCE CURRICULUM

Grade 8

Course:
Computer Integration

Course Goals:
- Become more knowledgeable and proficient in the most commonly used applications for computers in the home and in the workplace
- This is a continuation of Computer Applications I, taken in the 7th grade. Rather than a class focused primarily on computer skills, computer skills are taught in conjunction with projects from teachers of other subjects, thus integrating computers into the curriculum.
- By the end of the class year, through Hands-on lab work, the student will have gained more advanced computer application skills. Listed below are some of the skills and knowledge that must be demonstrated for each topic:

Text:
Handouts from various texts.

Software:
Microsoft Office 2007
Internet

Major Topics:

- Effective research using the Internet
- Desktop Publishing using Microsoft Publisher
- Spreadsheets, Graphs and Charts (Microsoft Excel)
- Other uses of Microsoft Excel: Timeline and Pop-up map
- Databases (Microsoft Access introduced)
- Advanced PowerPoint presentations

Skills Taught:
- Effective research techniques, using the Internet
- Creation of a 3-panel brochure using Microsoft Publisher.
- Using Microsoft Excel, develop an historical timeline.
- Advanced Microsoft Word Skills: Mail Merge
- Interactive, non-linear use of PowerPoint.

COMPUTER SCIENCE CURRICULUM

Grade 11/12

Course:
Advanced Computer Applications

Course Goals:
- Understand most commonly used applications for computers in the home and in the workplace
  - Concepts, Uses and Terms
  - Discuss them in class, learn by doing projects in the Lab, and on your own.
- By end of class year, through Hands-on lab work and class lecture, the student will have reviewed basic computer application skills, as well as gained in-depth understanding of several applications.
- Students who successfully complete this course *are eligible to receive college credit through Columbia Union College (CUC-credits).*

Software:
Microsoft Office 2007
Audacity
Wiki engine (available online)
VoiceThread (available online)

Major Topics and Skills Taught:
Listed below are some of the skills that must be demonstrated for each topic:
- Windows 2002 (XP) (How to manage files, directories and subdirectories; save properly; find files)
- Word Processing (Microsoft Word) – Advanced uses such as Mail Merge, MLA Format for research papers, (page numbers, proper margins and indentations, footnotes and references, headers, etc.); Proper Business correspondence elements—their placement, margins, etc.
- Spreadsheets (Microsoft Excel) – use of formulas, functions, and graphing. Use of spreadsheet with Mail Merge.
- Researching using The Internet –The whys and effective use of researching via the internet, including effective research techniques.
- Multimedia Presentations –the class will create movies using Microsoft MovieMaker, and various video editing software.
- Databases (Microsoft Access) - Develop a relational database to be used in school or other personal use. Create database queries, data entry forms, and reports.
- Web 2.0 Applications – students will learn various applications used on the internet such as podcasts and wikis. Students will create a podcast using VoiceThread, PowerPoint, and Audacity.
- Students will create, add, edit, and comment on Wiki pages using an integrated wiki engine.

COMPUTER SCIENCE CURRICULUM

Grade 10/11/12

Course:
Introduction to Computer Programming

Course Goals:
To provide students with a beginning course in computer programming covering the elementary concepts involved in algorithmic problem solving with computing machines. Students will create programs using a high-level programming language to implement simple algorithms.

Text:
Karel J Robot, A Gentle Introduction to the Art of Object-Oriented Programming in Java, Joseph Bergin, Mark Stehlik, Jim Roberts, Rich Pattis
A Guide to Programming in Java, Second Edition by Beth Brown; Published by Lawrenceville Press

Software:
Java Standard Edition 6.0
Eclipse Interactive Development Environment

Major Topics:
- Principles of computer organization and the major components (input, output, memory storage, processing, software, operating systems, etc.).
- An introduction to an Integrated Development Environment.
- Program organization following top-down methodology as well as object-oriented methodology.
- Variables, data types and the representation of data in computers.
- Making decisions in a programming language – Conditional Control Structures
- Making program statements repeat – Loop Structures
- Modularization of code – using methods to promote simplicity of design and code reuse.
- The software development process of requirements analysis, design, code, test, and revise.
- Identification of different careers in Computer Science, Engineering and Informational Technology.

Skills Taught:
- File management within an Integrated Development Environment
- Using stepwise refinement to break down a large problem into smaller more manageable units
- Tracing program statements to implement simple algorithms and “debug” program errors
- Select appropriate control structures to solve a computing problem.

Enrichment Activities
- Graphical User Interfaces
- Integrate JAVA programs with Databases

COMPUTER SCIENCE CURRICULUM

Grade 11/12

Course:
AP Computer Science (Preparation for the AP Computer Science A Exam)

Course Goals:
To provide an advanced level course in computer programming which culminates in the Advanced Placement Examination in Computer Science. This course is intended to offer the student the level of programming available to the prospective college freshman who intends to major in computer science, mathematics, or engineering. The course builds upon material covered in the Introduction to Computer Programming course.

Text:
A Guide to Programming in Java, Second Edition by Beth Brown; Published by Lawrenceville Press

Software:
Java Standard Edition 6.0
Eclipse Interactive Development Environment

Major Topics:

- Object Oriented Programming Methodology
- Design classes following principles of encapsulation and information hiding
- Inheritance and Polymorphism
- One dimensional Arrays – Traversals, Insertions and Deletions
- Searching and Sorting Algorithms
- Number Systems and Limitations
- Efficiency Analysis
- Exception handling

Skills Taught:
- Design and implement computer solutions to problems from a variety of application areas.
- Use and implement commonly used algorithms and data structures.
- Use standard Java library classes as specified by the AP Java subset
- Read, understand, and analyze a large case study.
- Test classes in isolation, identify boundary cases and generate appropriate test data, test integrated classes.
- Debugging – Categorize errors, identify and correct errors, use techniques such as debuggers, display additional output, and hand-trace.