

**Advanced Technology**  
**Fluency with Information Technology**  
**Mr. Shubert, instructor**

For high school students who can type at least 30 wpm and who have taken the Windows and Office course (or can demonstrate equivalent operating system and OpenOffice software proficiency), this course gives students the experience, knowledge, capabilities, and insights needed to effectively apply the information technologies of the present (and future) throughout their lives. We study various computing and networking technologies, write web pages and small programs using HTML and JavaScript, and evaluate implications of information technology for individuals and society.

**Text:**

Fluency with Information Technology: Skills, Concepts, and Capabilities, by Lawrence Snyder.  
Addison-Wesley, 2003. 0-201-75491-6.

**Materials:**

1-subject notebook for computing journal  
USB flash memory stick for storing files, or email account for transferring files

**Expectations:**

Each student will keep a computing journal, keeping study questions, definitions, procedures, and class and project notes, which will be checked periodically.

Assignments: Some assignments will be completed in class, and some will be taken home and completed by the due date.

Participation: Each student will be a valuable member in classroom discussions and presentations. Adequate participation consists in reading the material and having worthwhile things to say. Excellent participation goes beyond this to include asking appropriate questions and encouraging other students to share their ideas.

Project: A larger assignment, about 10 pages, on a subject suggested by the teacher and on a particular question or issue of each student's choice, using a combination of tools and techniques. Parts of projects may be presented to the class.

Tests: A midterm and a final exam.

**Academic Honesty:**

Our reputation depends on maintaining the highest standards of intellectual honesty. All of us will conduct ourselves so that together we establish a community of trust where no one plagiarizes, cheats, or obtains unauthorized academic materials.

**Grading:**

Computing journal/Participation	15%
Assignments	25%
Project	20%
Tests	40%

## **Course Outline:**

### Becoming Skilled at Information Technology

Week 1.

Read ch. 1-2.

Information technology: how it has changed, and how it changes our lives. Important terminology and the importance of the right terms. Basic components of computers. Hardware and software differences. Virtual, real, algorithms, abstraction, and other key ideas. Teaching yourself new applications. Acquiring the skills of experienced users. Process follows function. The basics of text searching. Thinking abstractly about technology.

Week 2.

Read ch. 3.

Internet access to information. Basic concepts of Internet routing. Protocols, physical and logical. Essay (2 pages): How the Internet works.

Week 3.

Read ch. 4.

HTML and how web pages are represented. Connections between web pages. Creating and editing web pages. Lab: Rewrite previous essay in HTML as a web page.

Week 4.

Read ch. 5-6.

Finding, understanding, and evaluating sources of information. Web search engines and queries. Advantages and limitations of web-based research. Refining web searches. Primary and secondary sources. Serendipity.

### Digitization and Algorithms

Week 5.

Read ch. 7.

Accuracy and precision in IT. Different ways systems can fail. Principles of debugging. Developing confidence and courage in debugging.

Week 6.

Read ch. 8.

Symbols and representation. Encodings and "escapes". Connect physical and logical worlds. ASCII codes. Converting information to useful digital forms. Tags and "metadata".

Week 7.

Read ch. 9.

Computers and integrated circuits. Major components of computer systems and their roles. How complex tasks are translated into simpler instructions. Computer simulation. Computer performance. Moore's "Law". Operating systems. Review and midterm exam.

Week 8.

Read ch. 10-11.

Algorithms, a familiar idea. The importance of language and context. Following the execution of an algorithm to alphabetize names. Pseudocode. Analysis and abstraction. Digital multimedia.

### Problem Solving

Week 9.

Read ch. 18.

Foundations of programming. Names, values, and variables. Introduction to JavaScript. Data types. How assignments change values. Syntax and expressions. Combining operations and the flow of control.

Week 10.

Read ch. 19.

Writing and running JavaScript programs. HTML tables. Controls. Event-based programming. Referencing parts of forms or controls. Development and test process. A program's logic and interface. The importance of design. Programming Lab 1.

Week 11.

Read ch. 20.

Abstraction, principles and purposes. Declaring and invoking functions. Functions in JavaScript. Building web pages with functions. Practice with HTML forms and JavaScript programs. Programming Lab 2.

Week 12.

Read ch. 21.

Iteration or repetition of actions; loops. Arrays or repetition of data; indexing. Principles of online animation. Programming Lab 3.

Week 13.

Read ch. 22-23.

Decomposition, divide and conquer. Animations. Mouse and keyboard events. Using functions to reduce complexity. The Turing Test. Solvable and non-solvable problems.

### Communication and Data

Week 14.

Read ch. 12, 16.

Email dos and don'ts. "Netiquette". Computer security concerns: passwords, viruses. Copyright laws. Intellectual freedom and property. Safety and the limits of software. Web-based commerce. Networked interactions. The importance of interoperability. Computer failures and recovery.

Weeks 15-16 (fall) [-18 (spring) ].

Read ch. 17, 24.

Issues in the privacy debate. Encryption terminology and use. How knowing concepts lets us ignore details. Lifelong learning in information technology. Fluency and managing IT. Project reports in class. Possible additional topics. Review and final exam.