IMPLEMENTING CS PRINCIPLES AS A BREADTH-FIRST SURVEY COURSE
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About the Course

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<th>Traditional Survey Course for CS Majors</th>
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Currently using Brookshear and Brylow (2015), Computer Science: An Overview

Curriculum

**Unit 1: Introduction**
Algorithms, metacognition, history of computing, seven big ideas
**Lab:** Lightbot Hour of Code
http://lightbot.com/hocflash.html

**Unit 2: Data Storage**
Logic gates, binary, hexadecimal, RAM, hard disk, ASCII, overflow
**Lab:** Logisim ripple carry adder
http://www.cburch.com/logisim/

**Unit 3: Program Execution**
How CPUs work, instructions, machine cycle, code vs data, masking
**Lab:** Machine language simulator
http://hmachine.sourceforge.net/

**Unit 4: Operating Systems**
Job scheduling, multitasking, components of OS, firmware, processes
**Lab:** Unix commands and files
http://www.ee.surrey.ac.uk/Teaching/Unix/

**Unit 5: Computer Networking**
Protocols, routers, client/server, Internet, IP, DNS, URL, HTML
**Lab:** Wireshark, mtr, web tools
https://www.wiresnark.org/

**Unit 6: Information Security**
Access control, privilege levels, malware, DoS, encryption, keys
**Lab:** Telnet vs ssh, encryption
http://extranet.cryptomathic.com/ascalc

**Unit 7: Algorithms and Python**
Primitives, pseudocode, problem solving, decisions, loop control
**Lab:** Intro to Python and IDLE
http://codingbat.com/python

**Unit 8: Programming Languages**
Paradigms, compiler vs interpreter, variables, functions, scope
**Lab:** Finch robot dance party
http://www.finchrobot.com/

**Unit 9: Software Engineering**
Software life cycle, prototyping, coupling, cohesion, UML diagrams
**Lab:** Static analysis, debugging
http://www.aptana.com/

**Unit 10: Data Structures**
Arrays, lists, stacks, queues, trees, pointers, contiguous vs linked
**Lab:** Visualizing binary trees
http://pythonfutor.com/

**Unit 11: Database Systems**
File system vs DBMS, schemas, relational model, SQL, data mining
**Lab:** Exploring your SQLite data
http://sqlite.org/

**Unit 12: Artificial Intelligence**
Turing test, semantics, production systems, state graph, heuristics
**Lab:** Finch robot obstacle course
http://www.finchrobot.com/

Flipped Classroom

**Mon**
Group Activity
Quiz

**Tue**
Reading and Notes
Online Tutorial

**Wed**
Reading and Notes
Reading and Notes
Videos and Notes

**Thu**
Reading and Notes
Start Lab
Questions

**Fri**
Q&A
Finish Lab
Finish Exercises

Assessment

- **Participation:** labs and exercises, online discussion posts, group activities
- **Quizzes:** vocab matching, multiple choice, fill in the blank, short answer
- **Explore Task:** collaborative research paper and poster presentation
- **Create Task:** pair programming assignment and individual reflection

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