

CS 105: Problem Solving

Course Introduction / Overview

Wholeness

- We are going to study problem solving because that is the essence of what programming is. We tell a computer how to do things, to take input, and to create 'good' output from it.
- A computer program is a tool that allows us to do less and accomplish more. Similarly TM is a tool that allows us to do less (gain restful alertness), and accomplish more (be more effective in action afterwards).

Problems Encountered

- In the US Nation Wide 30% to 60% of computer science students often fail their initial programming course
- People often speak of a ‘Geek Gene’, or some other type of predisposition that enables people to program (while others can’t).
- We aim to prove that hypothesis wrong, that it’s because intermediate steps are not properly explained that students get stuck
 - Similar to how there are **no students who are bad at math**

Success Guaranteed?

- Even though we are going to do our best
 - There is a chance that not everyone will be able to succeed.
 - We haven't cracked the teaching formula yet.
- Therefore:
 - Relax (stress kills creativity and problem solving abilities)
 - Do the work (relaxing != doing nothing)
 - Ask questions (it's the missing steps that we're trying to find!)

Memorization

- For a lot of students education has been centered around memorization, not reasoning
- The reality is you can look most things up online anyway
- Critical and Creative Thinking skills may be under-developed, often no attention or guidance has been given to them

Memorization

- Some memorization is always needed
 - You can't write a book if you don't know the alphabet
- But after the basics memorization is often laziness, why think and understand if you can memorize
 - Math formulas are a prime offender
 - Memorize the formula and you don't actually have to understand it, you don't actually have to be able know how it really works.

Creative & Critical Thinking

- Is memorizing how to do something a good thing for creativity, for making something new?
- Is memorizing good for critically analyzing something new, understanding what this new thing is?

Science

- Has science figured out how most things work, and are we at this point just filling in the missing details?

Models and Theories

- Gravity
- Evolution

Main Point 1

- There are many things still left to discover, and more and more jobs require people that are good at thinking (analyzing) and discovering / creating (synthesizing).
- Science and Technology of Consciousness: The nature of life is to grow. One of the key benefits of the TM technique is that it helps to develop our mental potential.

Why Study Computer Science?

- Computer Science is not the best name for our subject
- We primarily study how to process information
 - We create processes to manipulate data

Information Processes

- Business
- Biology
- Physics
- ***Life all around us***

Maharishi Quote

“The range of computer science is the whole range of activity because any activity emerges continues, and finds its fulfillment on the basis of some computing process”

CS and Thinking

- Analysis (breaking things down)
 - What is the problem?
 - What are its parts?
 - Can a part be broken into more parts?
- Synthesis (creating something new)
 - Can I solve a part?
 - How does the solution for this part relate to the solutions of other parts
 - How can I make a new whole (a solution)?

CS and Education

- You can memorize math formulas, and apply them again during the exam.
- What do you memorize in CS?
 - What does this mean for exams?

CS Teaches you to think

Steve Jobs: computer science is a liberal art

the Hour of Code is coming

From: <https://www.youtube.com/watch?v=IY7EsTnUSxY>

Main Point 2

- Studying Computer Science is all about gaining Analysis and Synthesis skills, central to Creative and Critical thinking.
- Science and Technology of Consciousness: Seek the Highest First, your brain is the foundation of all your activity. Make sure it works well, have plenty of rest, practice TM, create a foundation for thinking.

Thinking is Hard

- This may be why the CS dropout rate is so high
- It requires a specific type of thinking.
 - Both critical analysis (breaking into parts)
 - And creative synthesis (merging solutions to parts into a whole)
- Solutions come from within:
 - Never memorized, but created from inside
 - What if we're not used to that?

Our Brains are not Set

We always start not being able to do it, and then grow



From: <https://www.youtube.com/watch?v=JC82ll2cjqA>

Goals in this Course

- We aim to support and enhance your thinking abilities in this course
- Never feel bad for struggling
 - This is how your brain grows
 - Feel bad for not asking for clarification
 - Feel bad for not trying a different angle
 - Feel bad for giving up early

Flow Charts

- During the first 3 weeks we will start working with computer logic
 - Flow charts are an easy way to express processes
 - We will cover core programming concepts
 - If time allows we will go over these now
- You will be all set in CS If you can:
 - Analyze any problem and see the parts
 - Creatively synthesis a solutions with the tools you've learned (assignments, ifs, loops, functions)

Programming with Scratch

- Visual Programming Language
 - Made so you can play around with it
 - Still a real programming language
- We will use Scratch for our 4th week project since it allows you to (relatively easily) create something that is visually pleasing

Project

- Enjoy building something creative
 - What ever you like
 - More points for more intricate / interactive logic
- People with an A grade can get an AH (Honors) grade by solving Project Euler problems

Main Point 3

- In this course we are going to analyze (problems) and synthesize (solutions).
- Science and Technology of Consciousness: Rest and activity are the steps of progress. If you have any trouble at any time during this course, be sure to get plenty of sleep and meditate twice daily.

Summary

- The world needs more people who think with reason and logic.
- Computer Science is all about thinking reason and logic by analyzing problems and synthesizing solutions.
- This month will be focused on learning to work with just that. Solving a problem is nothing but taking something from an undesired state to a desired state.