

Work towards your goals

Do what you want
- Jim Cohoon

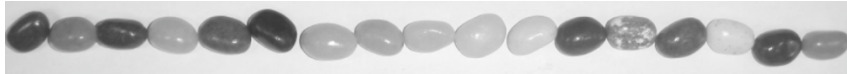
The future belongs to those who
believe in the beauty of their dreams
- Eleanor Roosevelt



Chrestomathics



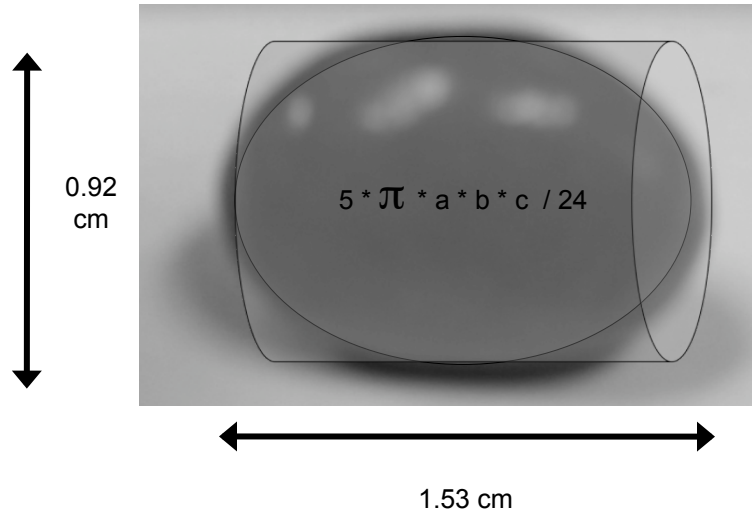
Jelly Beans



Jelly Beans



Jelly Beans



Jelly Beans



$$d * e / (5 * \pi * a * b * c * / 24)$$

424

BeanCount.java

```
import java.util.*;

public class BeanCount {
    public static void main( String[] args ) {
        Scanner stdin = new Scanner( System.in );

        System.out.print("Enter jelly bean length (cm): ");
        double a = stdin.nextDouble();
        System.out.print("Enter jelly bean width (cm): ");
        double b = stdin.nextDouble();
        System.out.print("Enter jelly bean height (cm): ");
        double c = stdin.nextDouble();
        System.out.print("Enter jelly bean loading factor (%): ");
        double loading = stdin.nextDouble();
        System.out.print("Enter jar size (mL): ");
        double jar = stdin.nextDouble();

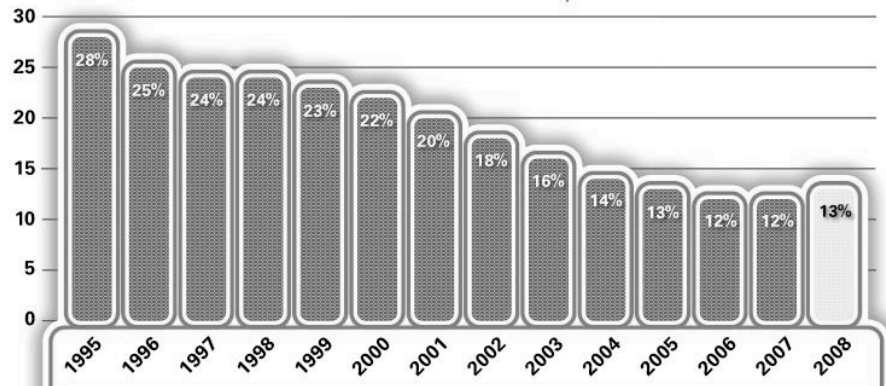
        int count = (int) ( jar * loading / ( 5 * Math.PI * a * b * c / 24 ) );
        System.out.println("beans: " + count);
    }
}
```

Starting point

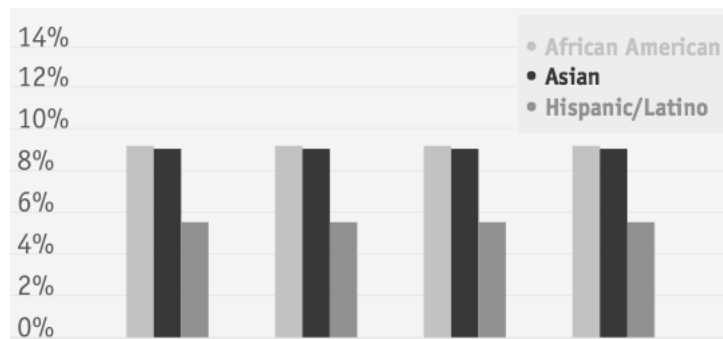


Declining interest – especially for females

Female percent of college-bound SAT-takers who intend a CIS major:



Racial and ethnic underrepresentation

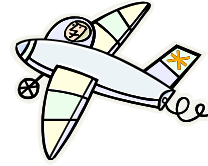


Commission on Professionals in Science and Technology

Take away – raised consciousness

A pilot section of the introductory CS course

- Targeted for students without prior experience



Using

- Integrated computer availability
- Motivating examples with broad appeal
- Routine discussions of options, advantages, and rewards of computing careers
- Establishment of a cohesive, ongoing culture

Produced

- Significant additional interest in computing among the students
- Attracted other students to take the course

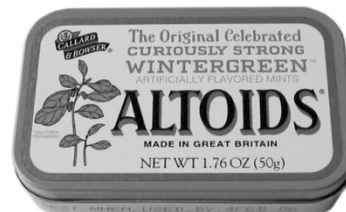
CS 1 – a curious course

Required course for all 1st year engineering students

- Introduction to programming
- First course in a BS computing degree
- Weekly closed laboratory

Contrary to national trends course enrollment is increasing - up 25% over the last 6 years

Improved CS 1 experience



CS 1 multiple entry points

CS 1

- Open to *all*

CS 1E

- Open to people with *experience*



CS 1E

Specification

- Provide *comparable* computing content
- *Common* assignments, tests, and grading
- *Open* laboratories

Result

- *Better* overall CS 1 environment
- *Contributes* to enrollments and *helps* with diversity
- *By itself* not a magic bullet



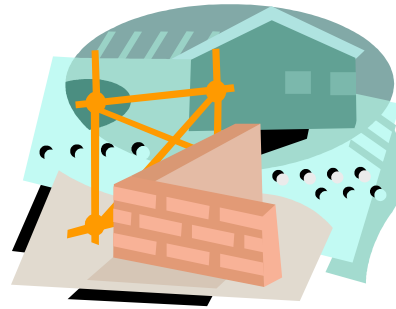
CS 1X – founding principles

We can do better

Same knowledge and experience goals as other sections

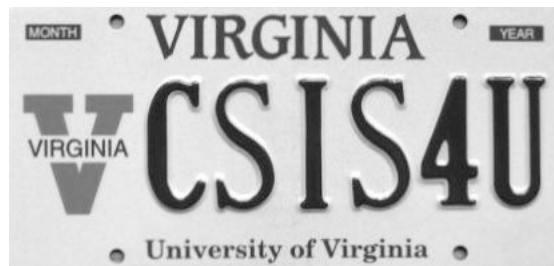
Different means

- Active learning
- Class culture of success
- Encouraging pedagogy
- Examples



CS1112 – founding principles

Vehicle for attracting majors



Class culture

Designed to encourage education, interest, and retention of a diverse community

Starts with preregistration

- Students must meet with me - we make promises to each other

Along the way

- Ice breakers and other activities
- Recognition and encouragement of accomplishments -- mentoring
- Routine discussion of options, advantages, and rewards of computing careers

mrs3v	dkj4d	kls2yc	eck3s	sep2q	kls2yc
\$100	\$100	\$100	\$100	\$100	\$100
\$200	\$200	\$200	\$200	\$200	\$200
\$300	\$300	\$300	\$300	\$300	\$300
\$400	\$400	\$400	\$400	\$400	\$400
\$500	\$500	\$500	\$500	\$500	\$500

Class culture

Designed to encourage education, interest, and retention of a diverse community

Promise of continuity beyond course time frame

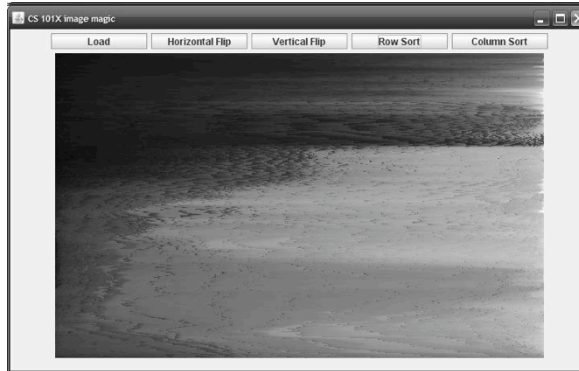
- Review sessions and tutoring



Class culture

Designed to encourage education, interest, and retention of a diverse community

I want *them* to *want* to be there



Pedagogy – active learning

Computer use at all class meetings rather than a separate lab

Integration allows for more student experience with computing

Students download over 150 classes and programs

- Not just to inspect, but to alter, modify, improve, integrate, and complete



Motivating examples

Need examples of broad appeal

Typical demographics

- %50 female
- 20% African-American
- 10% Hispanic



Examples

Major class examples based on survey of class interest

- 7-unit Likert scale

Looking for other schools to participate

Average rating varied from 5.4 down to 3.3 - interested to uninterested

Computing Interests Survey

Offering students interesting and meaningful examples that illustrate and apply computing concepts can improve learning. Your answers to the following optional and anonymous survey will help computer science instructors accomplish that goal.

Please rate your interest in the following topics as possible class and homework examples on a scale from extremely uninterested to extremely interested.

Information about a topic can be displayed by rolling the mouse over the topic.

Bank account interest	Extremely Uninterested	Very Uninterested	Uninterested	Neutral	Interested	Very Interested	Extremely Interested
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Battleship game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Body mass index	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bridge capacity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Examples

- Major class e
 - 7-unit
- Looking for o
to particip
- Average rating
from 5.4 d
interested
- Student inter
topic with
genders d

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Topic	Unfamiliar	Extremely Uninterested	Very Uninterested	Uninterested	Neutral	Interested	Very Interested
<u>Bank account interest</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Battleship game</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Body mass index</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Bridge capacity</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Teacher interest top 15

5.73	Card games
5.52	Password security
5.52	Encryption
5.36	Instant messaging
5.33	Connect four
5.30	Music player
5.26	Tic-tac-toe
5.10	Spamming
5.09	Sudoku
5.09	Daily jumble
5.05	Video player
5.00	Calculator
5.00	Battleship game
4.90	Virus protection
4.90	Photo manipulation

Teacher interest top 15

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5.36	Instant messaging
5.33	Connect four
5.30	Music player
5.26	Tic-tac-toe
5.10	Spamming
5.09	<i>Sudoku</i>
5.09	Daily jumble
5.05	Video player
5.00	Calculator
5.00	<i>Battleship game</i>
4.90	Virus protection
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Teacher interest top 15 and number 28

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5.09	<i>Sudoku</i>
5.09	Daily jumble
5.05	Video player
5.00	Calculator
5.00	<i>Battleship game</i>
4.90	Virus protection
4.90	Photo manipulation
4.54	Music library organizer

Student interest – female and male

Sudoku		Card games	
Instant messaging		Connect four	
		Instant messaging	
Connect four		Tic-tac-toe	
Photo manipulation		Music library	
Card games			
		Sudoku	
Music library			
Tic-tac-toe		Photo manipulation	

Outcomes

Comparable performance

Major declaration rates

- CS1X: 18% CS 1: 11%

Major population

- Females
 - CS1: 50% General: 13%
- Underrepresented minorities
 - CS 1X: 33% General: 10%

Persistence

- Every student but one has completed the course
- All CS majors from initial pilot graduated this spring

CS (Computer Science)	COURSE	SECTION	CREDITS	DAYS	TIME	INSTRUCTOR	LOCATION	ENROLLMENT	STATUS
CS 101	Intro To Computer Science								
60098	0001	03.0	1400	MW	098 402	Stonfield, Aaron	200/169	O	
60084	0002	00.0	2000	R	0LS 001	Stonfield, Aaron	40/17	O	
60090	0003	00.0	2000	F	0LS 001	Stonfield, Aaron	40/10	O	
60080	0004	00.0	1400	F	0LS 001	Stonfield, Aaron	40/10	O	
60108	0005	00.0	1000	F	0LS 001	Stonfield, Aaron	40/20	O	
60204	0006	00.0	1400	R	0LS 001	Stonfield, Aaron	40/20	O	
60108	0001	03.0	1530	MW	85C 341	Sullivan, Scott	84/29	O	

Take away and give away

How can you maintain a positive class environment for inexperienced students?

How would you improve the course



Take away and give away

Othello
Interval analysis
Enigma encryption
Art of Computer Science
Tracert detection
Fake-header sleuthing
Concordance creator
Color calculator
Minesweeper
Conway's Game of life
Games
Random Writer
Animation

Stanford's Nifty
Assignments
Shoots & Ladders
Hangman
Periodic table
Monopoly
Garal's Tires
Pacman
Match game
Robotics
RFID tracking
Homeland security

