

Welcome to cs3157!

Advanced Programming

Spring 2003

Section 001: MW 1.10pm - 2.25pm 833 Mudd

Professor Elizabeth Sklar

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office hours: posted on my web page weekly

Class web page:

<http://www.cs.columbia.edu/~cs3157>

course objectives.

- to give you practical, hands-on experience at advanced programming tasks
- to learn many new tools and learn how to learn other tools
- to simulate a “real-life” programming environment in which you have a customer and you have to answer to that customer

resources.

- lectures
- lecture notes
- recitations
- books
- the Internet
- class web page
 - <http://www.cs.columbia.edu/~cs3157>
- TAs
- me
 - BUT DON'T E-MAIL ME CODE!!

textbook.

oh wait...

There is NO set textbook for this class.

oh dear...

but I will give you some references

and you will learn how to find your own references, both on-line, in the bookstore and

oh my...

in the library.

assessment.

- 6 homework assignments, 10 points each, total = 60 points
- in-class exercises on lab days, total = 25 points
- 3 in-class quizzes, 5 points each, total = 15 points
- There will be NO MIDTERM and NO FINAL (*yippee!*)

a word about homeworks.

- **MUST** be done on your own!!!
- this is **NOT** a group project class
- you can get help from the TAs and me
- you can also get help from friends, following the “NOT CHEATING” rules of the department as outlined here:
<http://www.cs.columbia.edu/academicpolicies.html>
- you **MUST** acknowledge all help received by citing the names of those who helped you in the comments of your program and/or your assignment documentation
- this not only protects you from being accused of cheating, but also protects you in case your helper gives you misinformation
- this also lets me know who is really helpful, which is useful in selecting TAs for next semester

homeworks: submission policy.

- homeworks are due on the day that they are due
- here are the rules — please know them well:
 1. all homeworks **MUST** be submitted electronically by 6AM on the due date
 2. all assignments will have both a programming and a documentation portion
 3. you **MUST** submit an **ELECTRONIC** copy of the programming portion of the assignment
 4. electronic submissions:
 - submission time is clocked according to the time of your electronic submission
 - be aware that the system tends to get clogged when too many people try to submit at the same time — so **AVOID A LATE PENALTY** and don't submit too close to the 6AM deadline!
 - you may have a total of 50 hours grace time for lateness of electronic copies, which may be used up all at once or split between several assignments
 5. hardcopies:

- the hardcopy of the documentation portion must be brought to class on the day the assignment is due and deposited in the homework box in the front of the classroom within the first 5 minutes of class
- a TA will come to class and collect the box at 1.15pm
- if your hardcopy does not make it into the box, you will lose points
- if you attempt to bribe the TA, you will receive 0 for that assignment
- if you must miss class, have a friend deposit your hardcopy in the box

- exceptions and extensions are possible, primarily based on **MEDICAL EMERGENCIES** — circumstances must be documented and suitable arrangements will be made — you must consult me via email on an individual basis

homeworks: regrade policy.

- if you feel that there was an error in grading your homework or quiz, then you need to write on a piece of paper a description of the error
- STAPLE the paper to your homework or quiz and leave it with me to be regraded
- know that the TAs are given a list of expectations for each homework assignment and quiz and told where to take off points — so if your complaint is that too many points were taken off for one kind of mistake or another in your program, then generally those types of things will not change in a regrade
- if there is a genuine error in the marking, like we thought something was missing, but it is really there, then you will likely get points restored
- HOWEVER, a regrade means that the entire assignment or quiz will be remarked, so be aware that your mark can go DOWN as well as UP
- regrades take a while to process, so be patient — if you need the work to study from, then make a copy of it before you turn it in for a regrade

homeworks: a word to the wise.

- save early and save often!
- disk drives crash
- floppies have bad sectors
- power supplies fail
- monitors die
- mice get trapped
- SO back up in several places
- paper print-outs are the best security known to mankind

a word about lectures.

- brief notes for every lecture will be placed on the syllabus section of the class web page
- **BUT THEY ARE NOT A SUBSTITUTE FOR COMING TO CLASS**
- If you must miss a class, YOU are responsible for getting notes from someone who did come to class
- I will try to post lecture notes on the web before class, BUT:
 - I strongly encourage you to take notes yourself because you learn better when you actually write things down
 - everything I say is NOT in the lecture notes, although anything I say MIGHT be on a quiz or in a homework, so you need to take notes on what I SAY
 - sometimes there are mistakes in the lecture notes which get caught and corrected during class

a word about feedback.

- homeworks and quizzes let me know how you are doing
- and in a way, they let me know how I am doing, as a reflection of how you are doing
- but, I welcome feedback from you
- email, anonymous written notes, etc.

a word about academic integrity.

- the work you submit for assessment should be completed ON YOUR OWN
- you may get help from TAs, me, friends
- BUT YOU MUST ACKNOWLEDGE ALL HELP GIVEN
- you should not mail code or copy files
- if someone asks you to do this, *JUST SAY NO!*
- *This is NOT a group project class — so if you seem to be getting too much help, you will be contacted by me and/or a TA.*

topics covered.

as much as we can take of the following:

- Java graphics programming
- C (from Java)
- shell scripts, perl
- software engineering basics
- software documentation, user documentation
- configuration management
- make, UNIX tools
- processes, threads and sockets
- multi-language programming
- Internet programming (HTML forms, CGI, Javascript, PHP, Tcl/Tk)
- UNIX software package and installation tools (tar, gzip, rpm)

so, let's get started...

- you are now the newest employees of **EduGameCo**
- you have all been hired to write an educational game
- you will spend the whole semester defining and refining the game
- as you become more knowledgeable, the game will become more sophisticated
... *(or at least that's my intention)*
- you will work for a customer ... *(besides me)*
for example:
 - a younger sibling
 - a little cousin
 - someone you babysit for
 - your computer illiterate roommate
 - a schoolteacher you know
- you will need to keep track of how much time you spend on various tasks (like designing, programming, documentation)

a brief overview of educational games

- history
- anatomy
- motivation
- controversy

educational games: Interactive Learning Systems (ILS)

- definition:
“Ultimately, all learning is interactive in the sense that learners interact with content to process, tasks to accomplish, and/or problems to solve. However...I refer to a specific meaning of interactive learning as involving some sort of technological mediation between a teacher/designer and a learner. [Thomas Reeves, 1999]
- two major approaches to ILS:
 - *instructive*: learn “from”
 - *constructive*: learn “with”

educational games: Instructive Learning Systems

- computer-aided instruction (CAI)
- intelligent tutoring systems (ITS)
- frame-based tutoring systems:
 - trace problem solving sessions
 - customize for individuals
 - select next step dynamically
 - coach users
- examples:
 - memory modeling (Roger Schank)
 - representation of misconceptions (Kurt VanLehn)
 - construction of rules (John Anderson)

educational games: John Anderson

- PhD Stanford, at CMU since 1978
- production systems: ACT, ACT*, ACT-R
 - Algebra tutor
 - Geometry tutor
 - LISP tutor
- acquisition of cognitive skill
- 3 stages of development:
 1. declarative stage
 2. knowledge compilation stage
 3. procedural stage

educational games: Constructive Learning Systems

- *Constructivism* — Jean Piaget
- *Constructionism* — Seymour Papert
- LOGO (circa 1970's)
- Star*LOGO (1990's)
- Mindstorms (1999)

educational games: Seymour Papert

- at MIT since early 1960's, by way of South Africa, Cambridge and Geneva
- Perceptrons (1970)
- Mindstorms: Children Computers and Powerful Ideas (1980)
- The Children's Machine: Rethinking School in the Age of the Computer (1992)
- The Connected Family: bridging the digital generation gap (1996)
- <http://www.mamamedia.com>

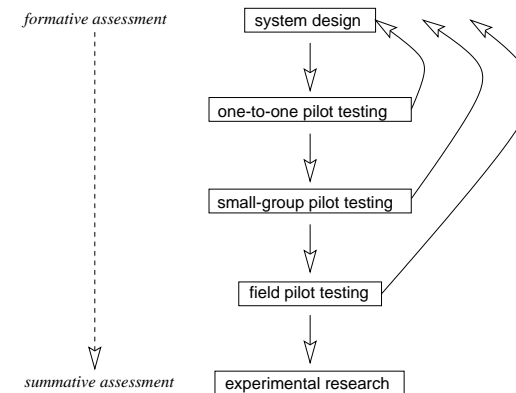
educational games: Anatomy of an ILS

- components
- system development cycle
- evaluation methodologies

educational games: ILS components

- *domain knowledge*
- *teaching component*
- *user interface*
- *student knowledge*
- *system adaptivity*
- *control component*

educational games: system development cycle



educational games: evaluation methodologies

- pre and post tests
- surveys
- session logs
- system products
- observations

educational games: motivation

- “Oh, if kids were only as motivated in school as they are in playing Nintendo.” [Elliot Soloway, 1991]
- “Children assimilate information and acquire skills with astonishing speed when playing video games. Although much of this gain is of dubious value, the phenomenon suggests a potent medium for learning more practical things.” [Herb Brody, 1993]

educational games: Thomas Malone

- PhD Stanford, at MIT since early 1980's (?)
- comprehensive experimental research: “What makes computer games fun?”
- challenge
- fantasy
- curiosity

educational games: Toys vs Tools

- Malone makes an important distinction
- Toys:
 - exist for their own sake, with no external goals
 - difficult to play, to increase challenge
- Tools:
 - exist because of their external goals
 - easy to use, to expedite the user's goal
- Educational Software:
 - Toy *and* Tool

educational games: Internet learning communities

- CoVis [Roy Pea, 1993] (<http://www.covis.nwu.edu/>, <http://www.letus.org/>)
- Belvedere [Dan Suthers, 1997] (<http://lilt.ics.hawaii.edu/belvedere/index.html>)
- KIE, WISE [Marcia Linn, 1995] (<http://wise.berkeley.edu/>)
- Concord Consortium (www.concord.org)
- EOE (www.eoe.org)

educational games: Multi-player educational games

- MUD's
- Pueblo [Jim Walters & Billie Hughes] (<http://oldpueblomoo.arizona.edu/>, <http://bessie.englab.slcc.edu/>)
 - start-up
 - help
 - reality check
- MOOSE Crossing [Amy Bruckman] (<http://www.cc.gatech.edu/elc/moose-crossing/>)
 - Internet

educational games: Controversy

- “No matter what we do, a huge infusion of technology is coming to education. It doesn't matter if it works or not, whether we make mistakes or not. It's coming because so much money is behind it. And because that infusion of technology is inevitable, it would be nice to start adding some new perspectives about technology in the schools. It's just possible our decisions about technology in schools are not being guided by the instincts of our best teachers. Right now, we run the risk of being blinded by science.” [Tom Snyder, 1994]

educational games: Jane Healy

- Failure to Connect: How Computers Affect Our Children's Minds (1998)
- not enough pedagogy
- not enough research
- too much, too soon?
- are computers better than TV?

to do.

- sign up for a lab session, EITHER:
 - WED 1.10pm-3pm
 - OR
 - FRI 10am-12noon
- get a CS account (if you don't already have one):
apply at <https://www.cs.columbia.edu/accounts>
(note that the account costs \$50)
- find a customer
- check out the class web page:
<http://www.cs.columbia.edu/~cs3157>

about me.

- undergrad: Barnard, CS major, class of 1985
- 10 years of industry experience working as a scientific and business programmer
- grad school: Brandeis University, PhD 2000
- previous teaching:
 - Monash University, Melbourne, Australia
 - University of Melbourne, Melbourne, Australia
 - Boston College, Massachusetts
 - came to Columbia in Fall 2001
- research interests:
 - learning in humans and agents, virtual and embodied
 - RoboCup, RoboCupJunior
 - Internet communities
 - simulations

about you.

- please take out a piece of paper and write down...
 1. your name
 2. your class and major OR if you are a non-matriculating student, categorize yourself
 3. the CS courses you have taken so far
 4. why you are taking this course
 5. what you hope to get out of this course
 6. one sentence about one wonderful thing you did over the break
- ...and give it to me before you leave