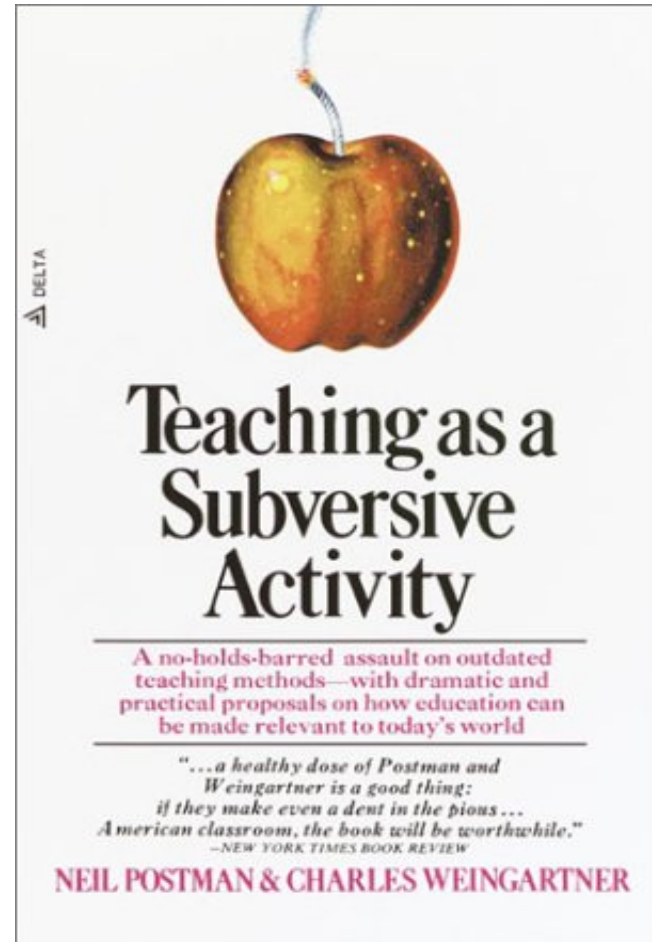


Computer Science for Programmers, Scientists, Informaticians, Gamers, Facebookers, ...

<http://www.compscipbl.org>

Teaching as ...

English is not history and history is not science and science is not art and art is not music, and art and music are minor subjects and English, history and science major subjects, and a subject is something you 'take' and when you have taken it, you have 'had' it, and if you have 'had' it, you are immune and need not take it again." (The Vaccination Theory of Education?)



We Teach Problem-Solving!

- Algorithms

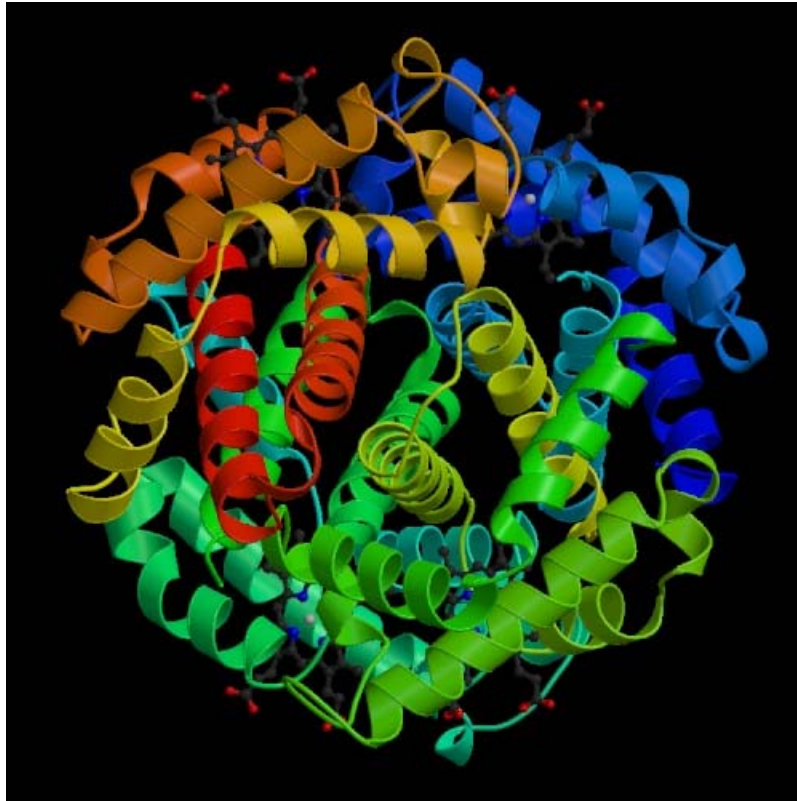


- Bioinformatics

- Visualization

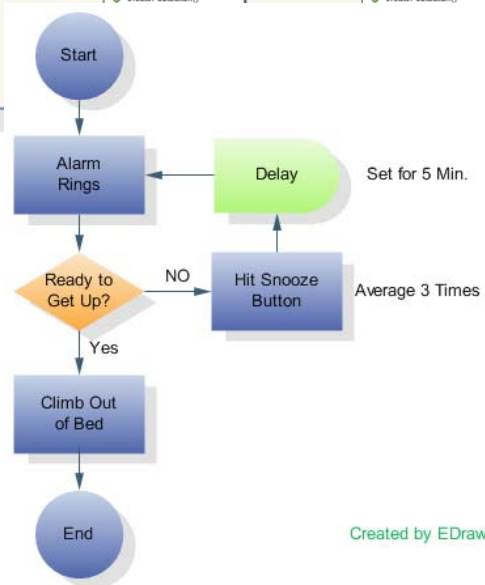
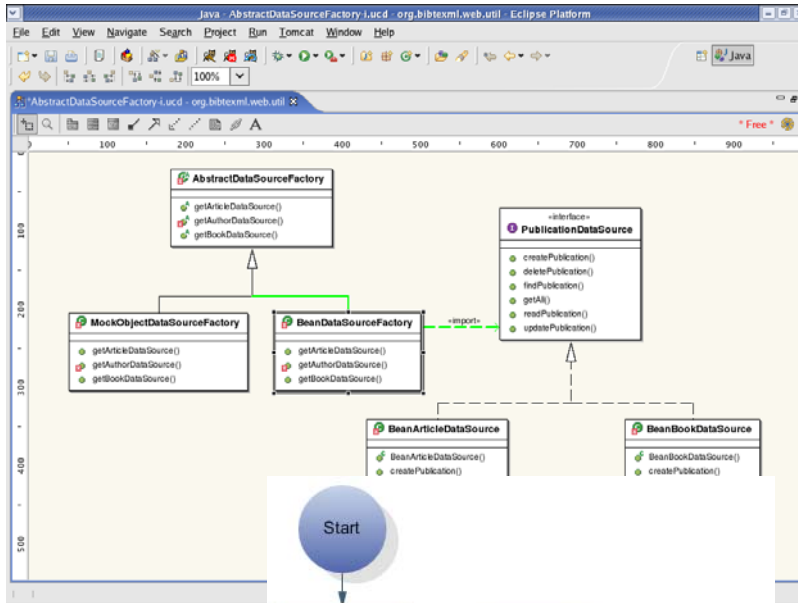
- Programming

We Teach Problem Solving!!!



- Algorithms
- Bioinformatics
- Visualization
- Programming

We Teach Problem Solving!!!



- Algorithms
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We Teach Problem Solving!!!



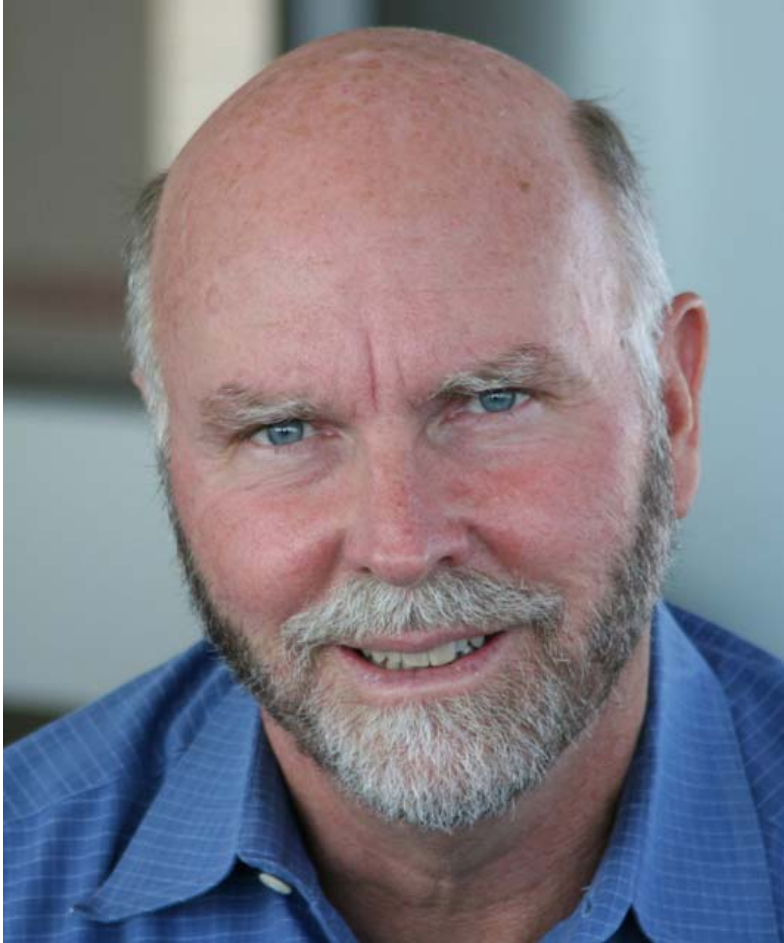
- Algorithms
- Bioinformatics
- Visualization
- Programming

Who is this? What does he do?



- Computer Scientist
- Biologist
- Scientist
- Programmer

Who is this? What does he do?



A. Computer Scientist

B. Biologist

C. Scientist

D. Programmer

Who is this? What does he do?



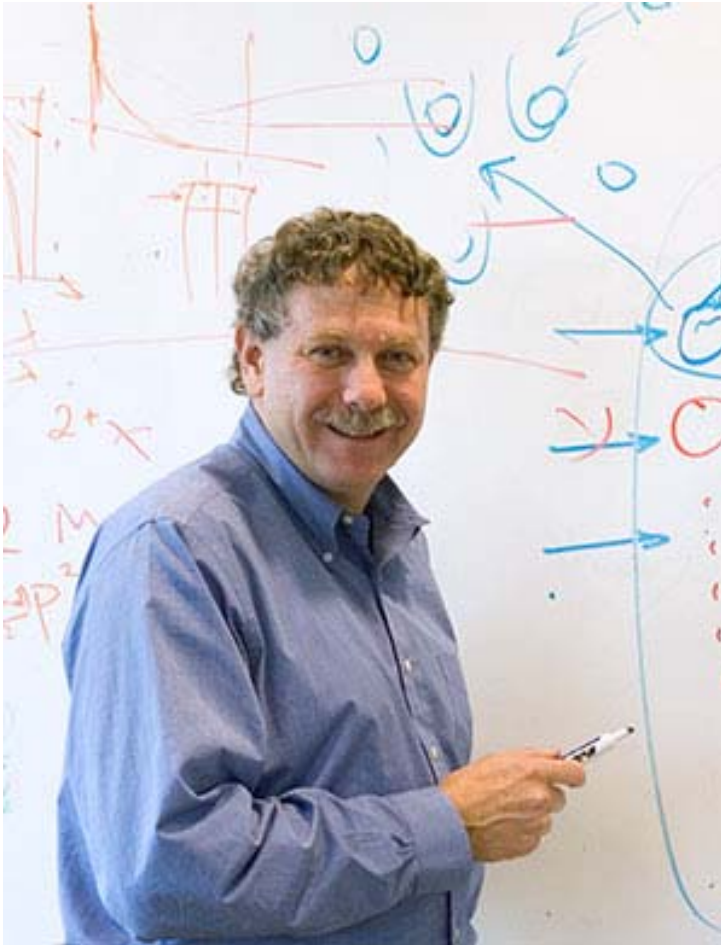
A. Computer Scientist

B. Biologist

C. Scientist

D. Programmer

Who is this? What does he do?



A. Computer Scientist

B. Biologist

C. Scientist

D. Programmer

Who is this? What does she do?



A. Computer Scientist

B. Biologist

C. Scientist

D. Programmer

Who is this? What does she do?



A. Computer Scientist

B. Biologist

C. Scientist

D. Programmer

WWDD?



SECANT 2007

Interdisciplinary minors

- **At Duke it is difficult to double major in sciences**
 - Too many requirements, 17 courses in biology
- **Students are interested in credentials**
 - No business major/minor, certificate program (requires intro, capstone, six courses)
- **Minor requires five courses, double counting ok**
 - Three courses in CS, two in econ or biology
 - From gene to social networks, data mining, ...

Genome Revolution Focus Course

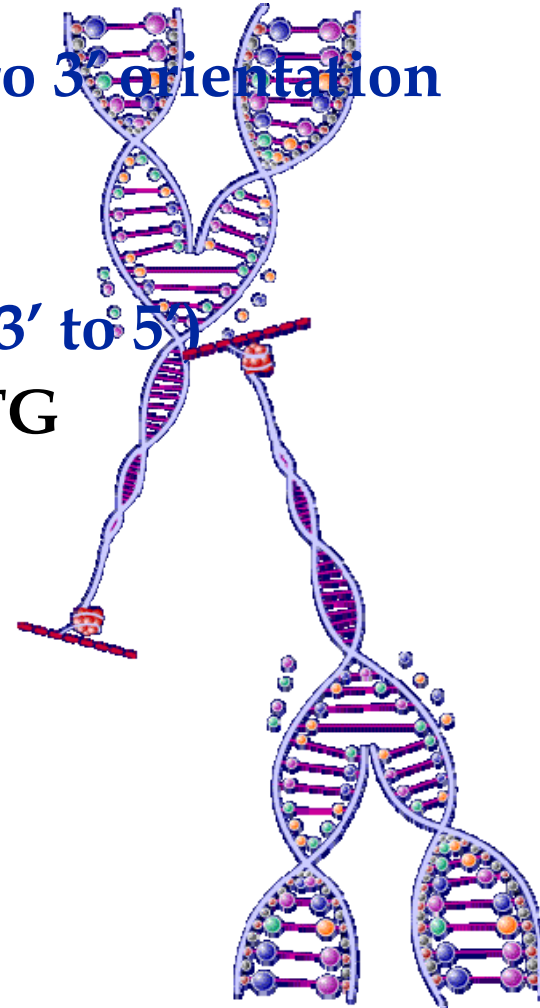
- **Arts in Contemporary Society, Exploring the Mind, Evolution and Humankind, 20th Century Europe, Visions of Freedom, The Genome Revolution and its Impact on Society, ...**
 - **Two of four courses, (previously 3/4 writing). Interdisciplinary 0.5 credit seminar P/F**
 - **Seminars, students live in same dorm**
 - **600+ out of 1600 in FOCUS course**
- **For Genome, 80 applicants for 30 slots, 65% women**
 - **In CS Genomics course 8 women, 9 men**

Simple examples

- **Given strand of DNA, calculate CG ratio**
 - **Potential source of proteins “CGGATTATC”**
- **Given protein “HLVWW” calculate number of different DNA strands that could code for it**
 - **64 codons, 20 amino acids**
- **Find heaviest protein in array of proteins**
 - **Given atomic mass of amino acids**
- **Interpret ORF data from NCBI website**

From Algorithms to Objects

- Read DNA assumed to be in 5' to 3' orientation
 - Use BioJava to read via http
- Construct reverse complement (3' to 5')
 - From CAATT produce AATTG
- How big is the human genome?
 - Runtime of algorithm $O(1)$

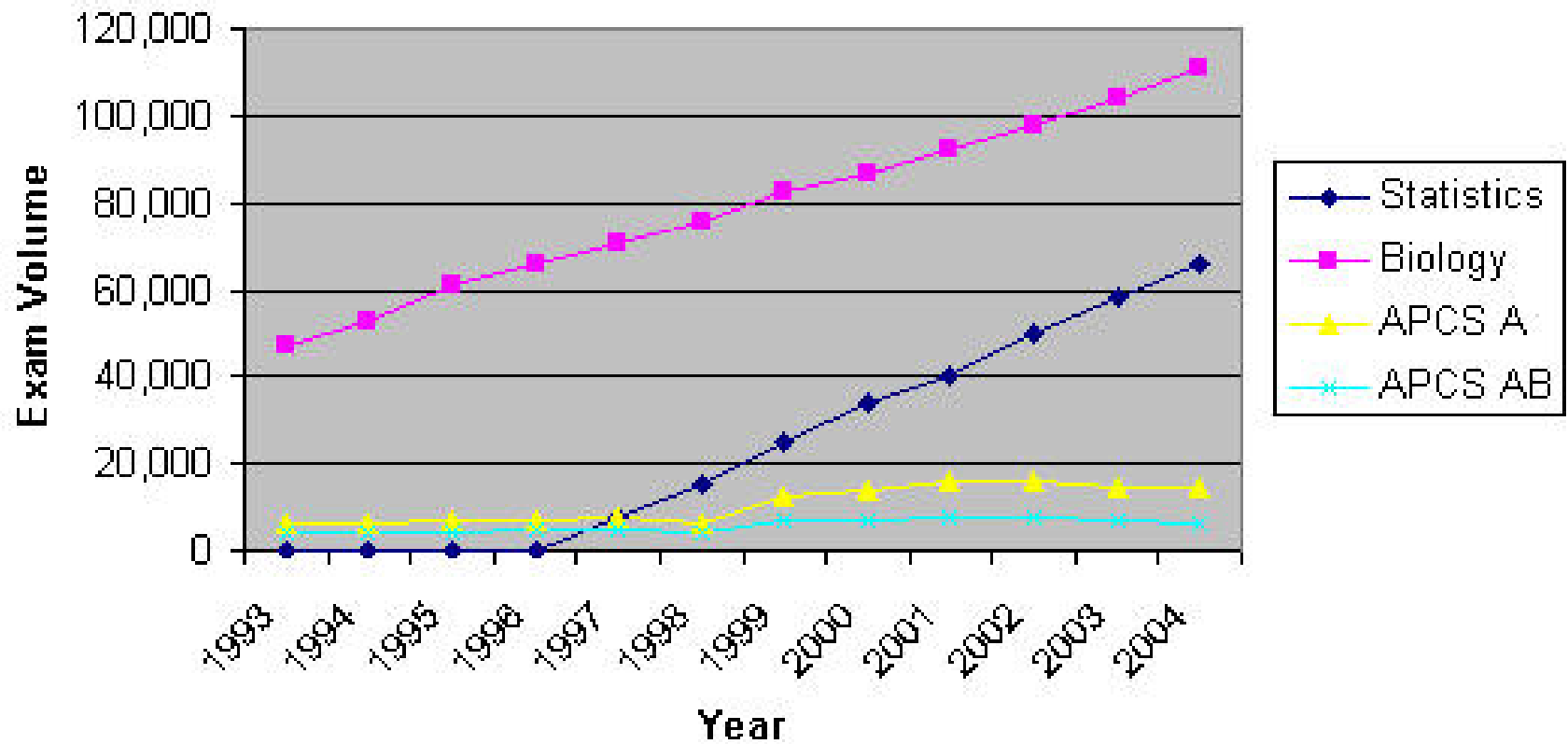


**You won't major in CompSci
if you don't take a course.**

Why is the first year different from all other years?

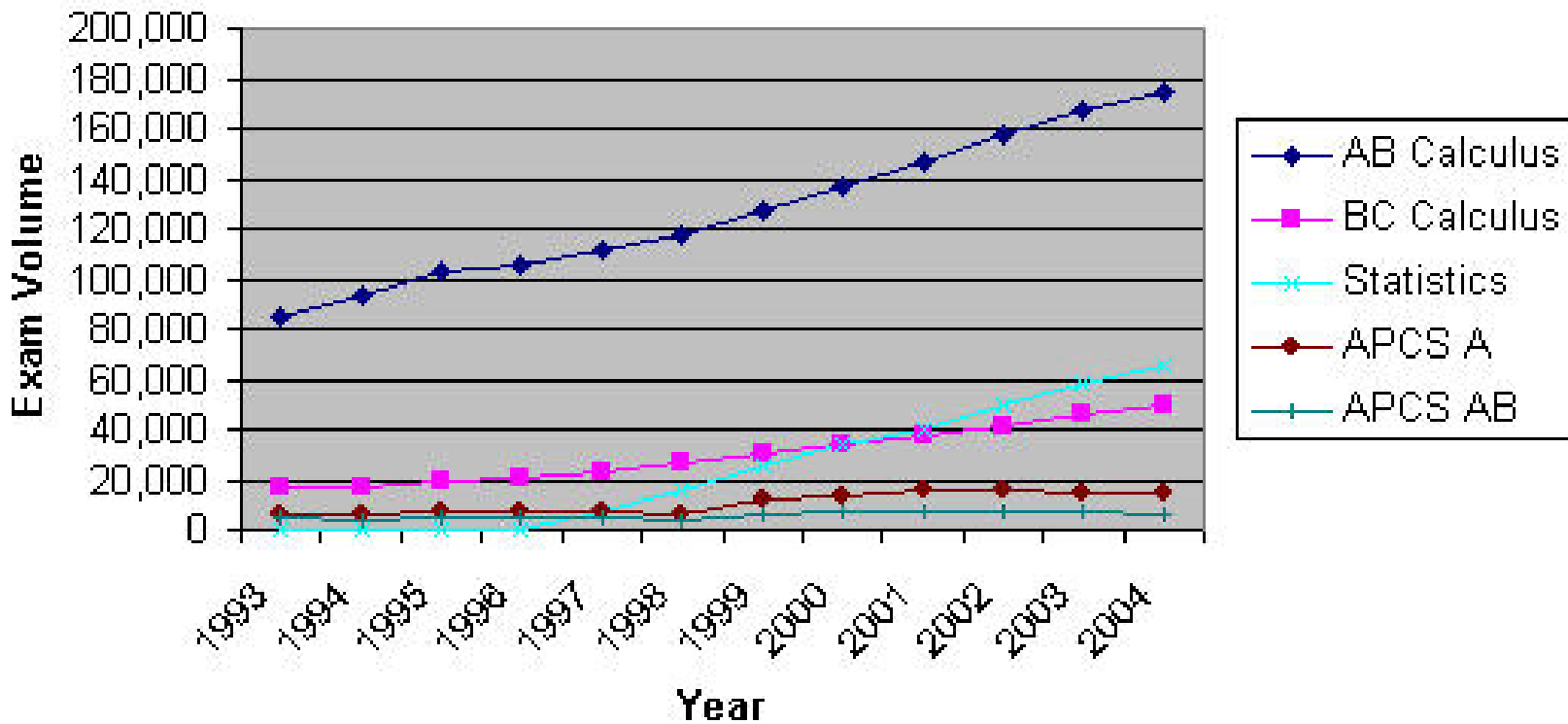
Who's going to College?

AP Exam Trends



Who's going to College?

AP Exam Trends



Major concentrations

- What about going to law school, medical school, Wall street, Google, Microsoft, startup, GE, teaching, graduate school, ...
- Software design
 - Web 2.0, sensor networks, robotics, ...
- Theoretical and algorithmic computer science
 - Game theory, auctions, distributed search, ...
- Technology and policy
 - IP²: intellectual property v Internet Protocol

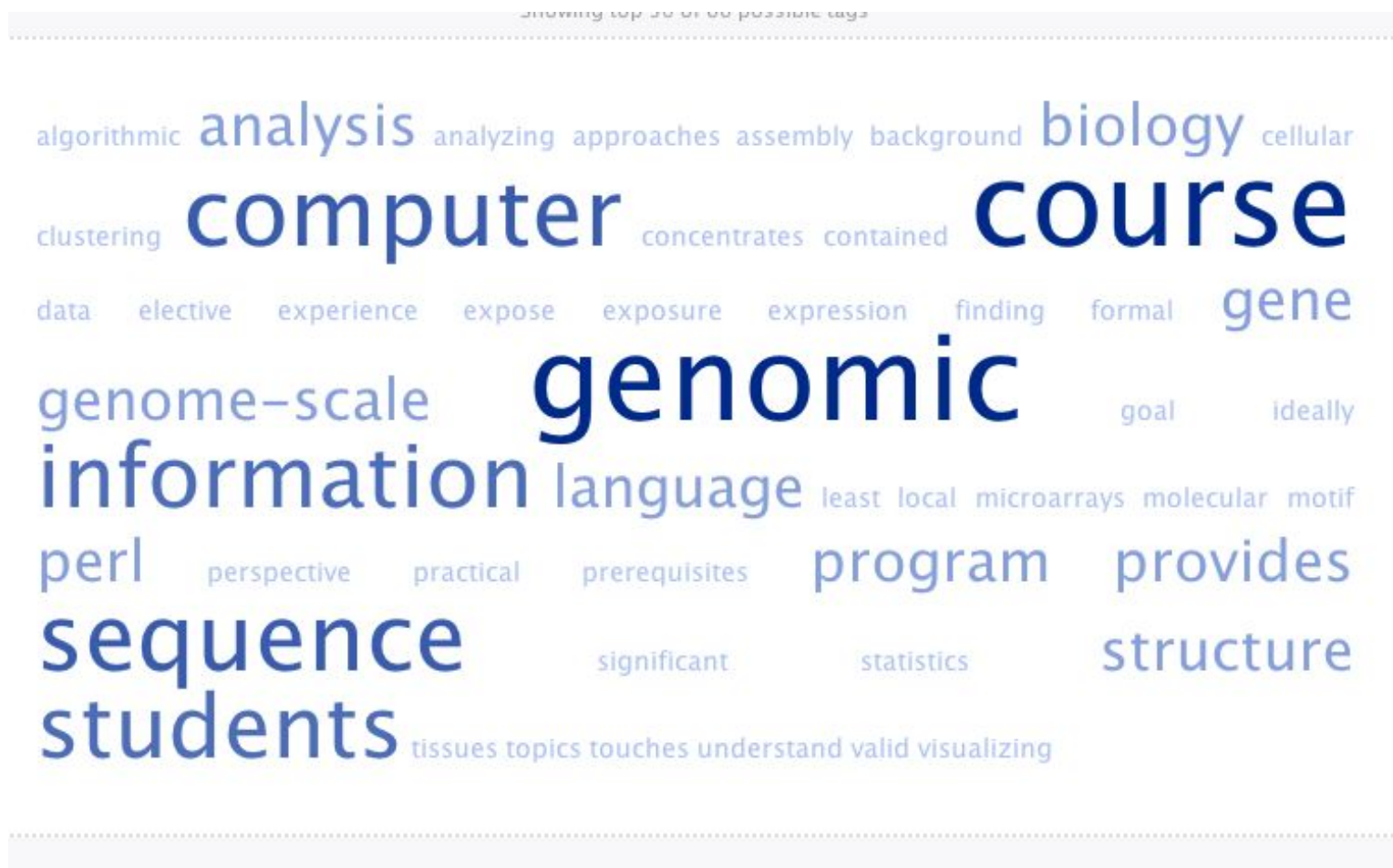
History and Computer Science

- Those who cannot remember the past are condemned to repeat it.



- Don't know much about history, don't know much about biology, don't know much about a science book

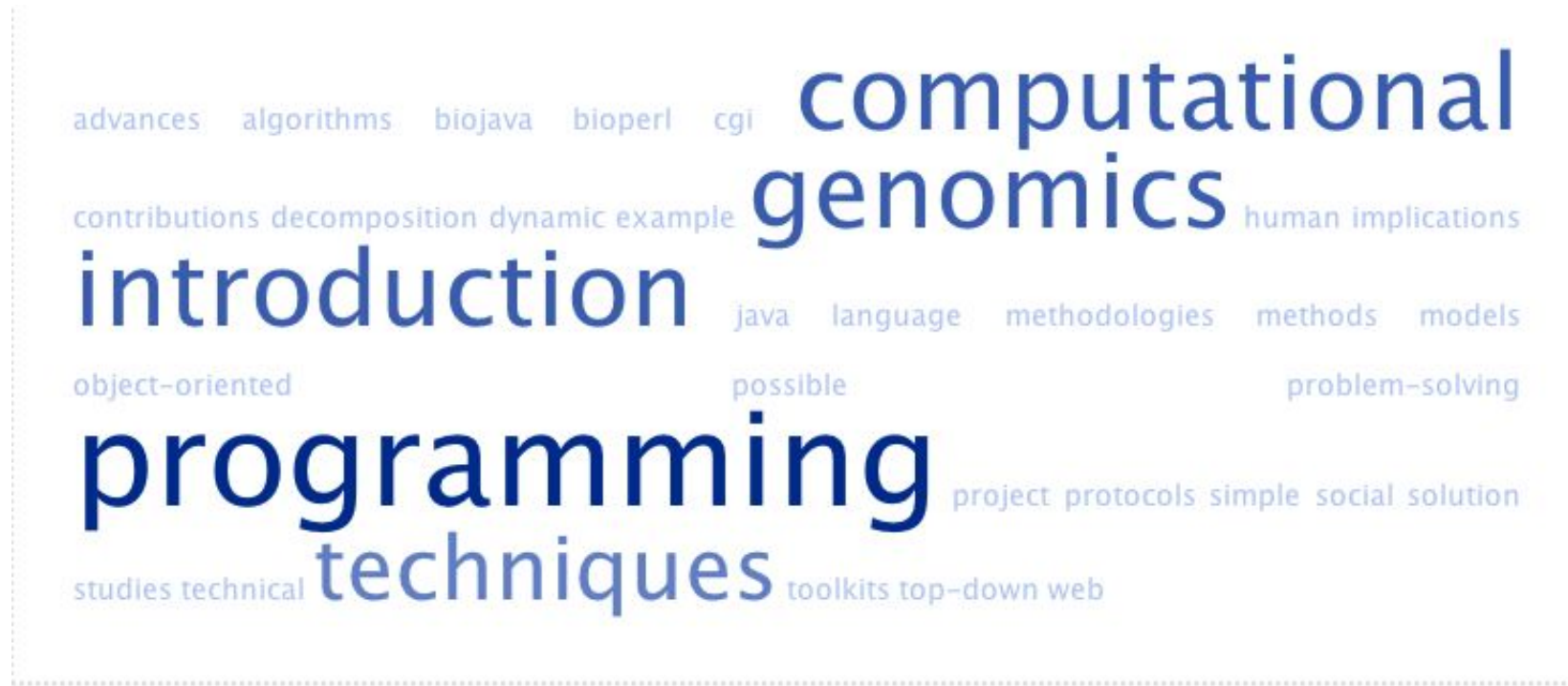
Computational Genomics



Computational Modeling

algebra algorithmic analysis basics being **chapter** commit commonalities
computational contract **course** cps definition depending
discrete discussed **dynamic** examples first-order
fixed functions general howat interest introduction israel **Idds**
lectures linear listed london mathematical
modeling motivation page plan previous
recurrences results **scalar** sections
stability stiffness syllabus **systems** taught tentative
textbook tulaczyk **versus**

Programming for Genomics



Computational Economics

actions auctions background become clearing
communication computationally
computer constraint **course** cover deciding
design economic efficient express
game including intensive interaction less
market marketplaces mathematics
mechanisms necessity opportunity
optimal outcome package participant
parties phenomena poker pose prerequisites probably
problems require resources second strategic
students **study** techniques theory
third travel worth years