# How can we build a bioinformatics programme that works?

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# The Main Questions

- What should be in our syllabus?
- How should we teach it?
- What kind of bioinformaticists do we want?
- What about those who won't (or can't) do bioinformatics afterwards?

# Syllabus: The Core

- molecular biology
- structural biology
- cell biology
- genetics
- basic maths
- statistics
- computing

# Syllabus: The Emphasis

- Bioinformatics changes rapidly:
  - Moore's Law
  - novel computing physics
- Biological problems change rapidly:
  - genomes
  - mammalian cloning
- …therefore we should emphasize *approach* over *content.*

# Bioinformatics Education Now

- mostly graduate
- mostly cross-training
  - biologists->maths and computing
  - computer scientists->molecular biology
- applications vs. theory
- much professional development
  - learning to use new tools

# Future Bioinformatics Training

- full undergraduate programmes
  - enough time to learn the *discipline* of programming
  - enough time to grasp the *complexity* of biology
- We need tool-users who are
  - *informed* and
  - *discriminating*.

# The “Bio”

- Bioinformatics is our chance to put the “bio” back in biomedicine.
  - Biologists are not doctors.
- Our emphasis should be on:
  - the power of the neo-Darwinian view of life,
  - *sub*-systems biology, and
  - the importance of new techniques.

# The “Informatics”

- EMBOSS-based C, Python or object-oriented Perl as languages of first training
  - Re-usability is crucial in team-based biological research.
- a solid grounding in elementary probability and statistics
  - emphasis of correct application of techniques over theoretical detail

# The Economics

- Today's shortage of bioinformaticists will become tomorrow's glut.
- Bioinformaticists must therefore gain generally useful talents:
  - programming (discipline)
  - rigorous problem-solving
  - intellectual "good taste"---a well-developed, high-tech bullsh*t detector