Freshmen Seminar: The Discovery of the Universe

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Caltech Optical Observatories

- Caltech first year undergraduate students ("frosh") have the option to take "Freshmen Seminar" (FS)
  - Pass/Fail course
  - Introduction to research
  - Offered by all departments
- The purpose is to expose frosh to research (and get them thinking about their summer research plan, "SURF" internship)

- The title of the course was grand:

  "Automated Discovery of the Universe"
- The thesis for the course is
  - Astronomers have built instruments that are now delivering *yuge* quantities of data
  - Much of the data has not been analyzed
  - So a diligent student can actually make a genuine discovery!

- Other reasons to take the course
  - Introduction to probability and statistics
    - Poisson distribution
    - Confidence levels
  - Analysis tools
    - Fourier Transforms
    - Filtering & Smoothing
- Learn programming
  - Surprisingly, some Caltech students have not done programming (I was astonished)

- Lessons Learnt (by instructor)
  - Python is the way to go (regretfully not MATLAB)
  - The importance & value of oral presentation and written reports
    - Two presentations by students (mid-way and final report)
  - Insist on a trip to Palomar (do not given an option)
    - Reward exceptional analysis with real allocation of night (cf SURF program)

- Open issues: Purpose of the Course
  - Is the course about astronomical discovery?
  - Is the course more of a cultural experiences (Python, analysis, statistics, presentation etc)
- Assuming that the goal is astronomical discovery
  - Should I have insisted on the class producing ra “publishable” result (and sent it for publication, cf. Baltic Astronomy)
  - How to avoid end of term taper off?

FS/Ay3