



# Bioinformatics for Beginners

First Year Seminar 100

Fall Semester 2006

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# First Year Seminars at WFU

- What is a Wake Forest First Year Seminar?
- **“intense intellectual interchange, both written and oral, in a seminar setting in which all participate...in critical thinking and analysis of arguments. Seminars should include **discussion and debate** on issues, examination of opposing viewpoints...and **written and oral assignments that force students to make explicit their ideas and thoughts...**”**
- All first year WFU students are required to take a FYS.
- FYS are proposed by individual faculty, approved by a college review committee.
- FYS must include 20 pages of finished written work during the semester and use of library resources.
- Class size is capped at 16.
- All WFU students are given a laptop (ThinkPad); all WFU classrooms have wireless connections; all classes have a Blackboard site and a library resource page.

# FYS + BeeSpace = a perfect match

- Classes meet once per week for 150 minutes.
- Class format: brief overview, on-line bioinformatics exercise, “read-along,” discussion, weekly writing assignment.
- During the second half of the semester, class time was used to work on group projects.
- Goals:
  - Students are introduced to bioinformatics in the context of 1. “nature vs. nurture” and 2. the BeeSpace Concept Navigator.
  - Students develop skills and display mastery by developing new BeeSpace educational materials for younger students.
- Special features:
  - Group session with WFU Science Librarian (resulting in creation of on-line resource page).
  - Field trip to research apiary.
  - On-line submission of weekly homework/feedback using “Track Changes” in MS Word.
  - Video conference with Bruce Schatz.
  - Each student participates in a “personal research session” with the Science Librarian.
  - Access to on-line BeeSpace educational resources.
  - Use of NCBI tools and resources.
  - Presentation of final projects to BeeSpace PIs via videoconference.

# Examples of class sessions

- Early in the semester:

**Overview and discussion:** What is a model organism?

**On-line, in-class exercise:**  
NCBI/PubMed on-line “scavenger” hunt.

**Read-along:** anatomy of a gene expression experiment (materials prepared by David Stone).

**Homework:** watch and critique BeeSpace video (prepared by Jim Buell).

- Late in the semester:

**Overview and discussion:** Nature and nurture and human behavior.

**On-line, in-class exercise:** working in pairs, test BeeSpace Concept Navigator features; brief oral report to class.

**Read-along:** NYT op-ed piece by Gene Robinson.

**Homework:** identify which goals of the North Carolina “Standard Course of Study” for middle school can be addressed in an educational project based on BeeSpace; submit draft of teaching manual that will accompany project

# Student Projects

- Projects were required to conform to the North Carolina Standard Course of Study.
- Projects required a “deliverable” for use in the classroom and an accompanying teacher’s manual.
- Materials are ready for use Summer 2007, and will be broadly accessible via the BeeSpace website.
- Students created: a board game (BeeLand), a Jeopardy game, a web site, several PowerPoint presentations, and rules for a game to be played outdoors.



Nature or Nurture	Non-Human Examples	Honey Bee Experiment	Environmental Influences	Genes
\$100	\$100	\$100	\$100	\$100
\$200	\$200	\$200	\$200	\$200
\$300	\$300	\$300	\$300	\$300
\$400	\$400	\$400	\$400	\$400
\$500	\$500	\$500	\$500	\$500

# Successes and challenges

- Students were introduced to the concepts of bioinformatics, the challenges of effective searching, and modern formulations of nature vs. nurture questions with regard to human behavior.
- Students embraced concept of learning by teaching, and worked effectively in groups to complete projects.
- Students interacted directly with researchers.
- Students proved *resistant* to the idea of gene x environment interactions.
- Students were sometimes distracted by minor technical glitches (delays in getting BLAST results, printer failures, videoconferencing problems).
- Busy student schedules and low number of students intending to major in a science precluded student transition to active participation in outreach.

# Resources

- <http://zsr.wfu.edu/research/guides/fys/bioinformatics.html>
- <http://www.wfu.edu/~lentjc6/homepage.html>
- <http://blackboard.wfu.edu/> (see Jim Buell for log in)
- This FYS will be offered again in Fall 2007 and Fall 2008.
- BeeSpace volunteers are needed for video conferences with students during Fall 2007.