GRADUATE STUDIES IN BIOSTATISTICS

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SITTING IN YOUR SHOES

- What to do with undergraduate degrees in Math and Economics?
  - Straight to workforce?
  - Actuarial studies?
  - Graduate school?

- What field in graduate school?
  - Law?
  - Statistics?

- Summer Institute in Biostatistics (SIBS)
  - Many participating universities around the country
  - More info:
    https://www.nhlbi.nih.gov/research/training/summer-institute-biostatistics-t15
WHAT IS BIOSTATISTICS?

- Application and development of statistical theory for use in biological, medical, and public health research
  - Rich application opportunities
  - Application-driven theoretical research and education
    - Ex. Survival analysis

- Versus statistics?
  - Less theoretical education, 'theory for the sake and interest of theory'

- Versus bioinformatics?
  - More focus on statistical theory in methods development
  - Less focus on straight computational research

- Extensive computer programming
  - R, Python, C+
  - Data visualization, simulation, “Big Data” and algorithm development
WHAT DO BIOSTATISTICIANs DO?

- Lead Statistician (PhD, Master's with many years of experience)
  - Suppose you are a scientist or policy maker and you have a question you want to answer with data. What do you do?
  - Design studies, decide how data will be analyzed, work with investigators
  - Employers: Government, research universities, medical device companies, pharma

- Professor/Developing of statistical methods (PhD)

- Programmer (Masters)
  - Carry out the dirty work of carrying out analysis plan, creating presentation of results (tables, graphs, etc.)

- General statistics
  - For strong programs, not limited to bio-fields
  - Ex. At UNC have had PhD grads at Apple, Google, AIG
EXAMPLES OF BIOSTATISTICS

Subfields
- Clinical trials
- Genetics
  - Precision medicine
  - Causal inference
- Imaging, spatial statistics, time series analysis

Assessing the effects of Cholera vaccination
- Want to separate out and quantify effects due to
  - Person being vaccinated
  - People around you being vaccinated
  - Incorporate spatial relationships

EDUCATION IN BIOSTATISTICS

Different degrees

- Master's
  - Less theory, focused on learning methods currently used in research
  - General structure: coursework (1 year), comprehensive exam (end of 1st year), thesis and coursework (2nd year)
  - Time duration: 2 years

- Doctorate
  - More theoretical education (level of theory depends on institution), goal is to train student to lead research studies and develop new statistical methods to address scientific questions
  - Can apply and enter program with undergraduate degree only
  - General structure: Master's coursework (1 year), PhD coursework (1 year), Qualifying exam (end of 2nd year), finish coursework and begin dissertation (3 year), complete dissertation
  - Time duration (usual): 5-6 years
DIFFERENT PROGRAMS

- Programs range in level of theory required for degree (especially PhD)
  - Generally top programs have extensive theoretical preparation

- Different programs generally have different research strengths
  - Clinical trials: UNC-CH, UWash, UMinnesota
  - Genetics: UNC-CH, UMichigan
WHY DID I CHOOSE BIOSTATISTICS?

- Allows a continuation in learning mathematical theory while learning how to analyze real data
- Focuses education on questions I find important to society
- Plentiful job opportunities globally, forward thinking employers

PAYING FOR EDUCATION

- Many post-graduate degrees are extremely expensive
  - Many Master's degrees, Law degrees require six figure debt
  - Applied nature of program => funding opportunities for Master's degrees
  - PhD degree => Funding

- Funding duties
  - Research assistant
  - Teaching assistant

- Funding amount
  - Tuition, stipend, health insurance
MY EXPERIENCES AND GENERAL ADVICE

Tips for choosing a program

- For Master's, focus on program quality and financial cost
  - Look at time to completion and job placement results
  - If potentially interested in PhD, program rigor and quality is very important

- For PhD, take all factors into account and don't focus the 'ranking number'
  - You will be living there for 5+ years, your JOB is to be a student and treat it as such
  - Program prestige is important, but only to a certain extent
  - Look at research opportunities, auxiliary departments, and research expertise of professors

My experience

- Difficult but very rewarding
- Unique opportunity to live in a college atmosphere
  - Many people around you of similar age
  - Part of graduate student community