



BME 2200: Biostatistics and Research Methods

Lecture 1: Introduction, On-Line Literature Search



Lucas C. Parra
Biomedical Engineering Department
City College of New York





Content, Schedule

1. Scientific literature:

- Literature search
- Structure biomedical papers, engineering papers, technical reports

2. Presentation skills:

- Report – Written report on literature search (individual)
- Talk – Oral presentation on biomedical implant (individual and group)

3. Graphical representation of data:

- Introduction to MATLAB
- Plot formats: line, scatter, polar, surface, contour, bar-graph, error bars. etc.
- Labeling: title, label, grid, legend, etc.
- Statistics: histogram, percentile, mean, variance, standard error, box plot

4. Biostatistics:

- Basics of probability
- Hypothesis testing, correlation, causality, significance
- t-Test, ANOVA
- Linear regression, cross-validation
- Error analysis
- Test power, sensitivity, specificity, ROC analysis



Stuff you need

Prerequisite:

BME 101, Math 203.

Literature

- Glantz, Primer on Biostatistics, 5th edition McGraw Hill **(required)**
- Schaum's outlines, Probability and statistics, 2nd edition, McGraw Hill (optional)

Software

- MATLAB
- PowerPoint
- Web Browser

All software available in B level computer lab Mo-Fr 9AM
-5PM



Grading

20% final exam, 20% presentation, 60% assignments

less than 60%: F

60% or more: D

70% or more: C

80% or more: B

90% or more: A

100% or more: A+

Exams and quizzes:

- Quizzes will test reading and programming homework.
- Final exam will test only biostatistics

Attendance:

- 100% attendance is expected
- No show, no help.



Assignments

1. MATLAB programing
 - Due one week from assignment.
 - Turn in by email **prior to class!**
 - May have **pop quizzes** to test “undisclosed collaborations”.
2. Literature search
 - Turn in as a report.
3. Reading
 - Understand the subject and cover gaps
 - May have **pop quizzes** on reading assignments.
4. Problems/Exercises
 - Turn in at the beginning of class.
 - Due on the next class.

All written assignments must include

Name, date, course number, assignment number.

Title whenever applicable.

Form matters!



Presentations

Oral presentation (group – in the middle of the semester)

- Will be developed as a group (3 students)
- Presented in sections by individual group member selected at random.
- Topics are implant devices:
 - artificial retina,
 - dental implant,
 - deep brain stimulation,
 - total hip replacement,
 - breast implant,
 - pacemaker,
 - cochlear implant,
 - cardiovascular stent.

Written report (individually – due date will be announced)

- Will be a summary of current state-of-the art research following literature search on any biomedical research topic of your choice.



Literature Search

Where to look?

- Pubmed (biomedical)
- scholar.google.com (all)
- ISI Web of knowledge (all science, citation search)
- IEEExplore (engineering)
- USPTO (US patents)
- CUNY+ (Books)
- Citeseer (computer science)

How to look?

- Start with google only if you really don't have a better idea.
- Read abstracts to narrow or generalize keywords
- Improve keywords as you learn the terminology
- Follow the author
- Follow the references



Literature Search (obvious do an don'ts)

What to look for: (loosely sorted by trustworthiness)

- Textbooks (n-th editions often easier to read)
- Review articles
- Heavily referenced articles
- High impact journals: e.g. Nature, Science
- Recent journal publications
- Scholarly journals in general

What not to look for:

- Do not always trust conference papers.
- Sometimes trust academic web sites (.edu).
- Do not much trust company web sites (.com).
- Never rely on a random individual's web page.

Demonstrate on a topic picked by the class.



Getting ready

Assignment 1: (due next class)

Select research question or engineering problem that interests you.

Find and bring the most relevant research paper to class.

Explain in writing (1 page):

- Define the topic in *detail* (what is it and what is it not)
- Why is this subject of relevance?
- What is the main research question?
- What is the main technical challenge?
- What are the relevant keywords to search for?

Pay attention to format! Your write-up has to be in print. Include CCNY logo, title, name, date, course #, and assignment #.

Document will be evaluated by other students!



Getting ready - Computers

- We will try to use laptops in class for on-line search and programming.
- We will have 11 laptops from the department.
- If you have a laptop please install the software and bring it to class (100% charged as we do not have sufficient outlets).

Thanks!

In-class computer use rules:

- The computers must be turned OFF and CLOSED unless you are instructed to work on a specific task.
- You will work in groups of 2-3 students per computer.
- No private time with your laptop during class! Hence:
- No email-ing,
- No IM-ing,
- No computer games,
- No random browsing or reading the news.