HPM 441
Data analytics: Identifying, collecting, and analyzing data in healthcare

Winter 2019
Tuesday, 10-11:50am: Haines A44
Thursday, 10-11:50am: CHS 43-105
Friday (optional), 11am-noon: Powell Classroom C

INSTRUCTOR: Corrina Moucheraud, ScD MPH
Department of Health Policy and Management
Phone: 310-206-1185
Email: cmoucheraud@ucla.edu
Office: 31-235A CHS
Office hours: Tuesdays 2-5 (drop in)

TEACHING ASSISTANT: Corinne Zahlis, corinnezahlis@ucla.edu

My goal is for you to learn a lot in this class -- and my job is to help you attain this! So please come see me outside of the classroom. The sooner the better! You can also always email me with questions on class content, assigned work, or other issues.

COURSE OVERVIEW:
Exploration of data sources and uses in healthcare, e.g., electronic medical records, social media, wireless biosensors, system and facility data. Review of hands-on techniques including data management, development of indices and metrics, choosing and implementing analysis methods and visualizations. Discussion of the role of data collection and processing within the healthcare system. Letter grading. Prerequisite: BIO 100A

COURSE STRUCTURE:
We will meet all together as a group (in-person) every week for 4 hours. On Tuesdays, we will have hands-on group work and discussion; on Thursdays, sessions will focus on didactic learning and guest lectures. In addition, there will be an optional 1-hour weekly “lab” for software/analysis skills-building.

The TA for this class will also hold weekly office hours, on Mondays from 12-2pm (room 31-236). This is an additional opportunity for you to review and discuss: (1) content covered in-class, (2) content from the skills curriculum, and/or (3) upcoming assignments. The TA will not discuss specific grades; please come visit my office hours for these queries.

ASSIGNMENTS:
All assignments must be submitted via CCLE, and should be labeled only with your ID number (no names).
1. **Homework assignments:** You will complete 2 short homework assignments during the quarter. You will work on these assignments in small groups and will submit 1 file per group.

2. **Exams:** This class will include 3 exams (2 in-class, 1 take-home), which will be open book/internet. These are applied exams where you implement the data analytic tools from classwork and homework.

3. **Worksheets:** There will be a short “worksheet” due each week. These are for your own learning and it is not required to submit these. However, for each worksheet you submit and receive a score of 90%+, you will get 2 extra credit points on the next exam (graded on 0-100 scale).

4. **Participation and engagement:** Participation and engagement is a major component of your grade. If students have concerns, please do not hesitate to let me know. Your participation and engagement grade will be comprised of two components:
   a. **In-class participation:** I expect and encourage active participation from all students. Remember that quality -- not quantity! -- matters. There will be a variety of mechanisms and ample opportunity to participate, for example full-class discussions, small group discussions, and informal “presentations.”
   b. **Peer rating of group work:** You will submit a peer evaluation for members of your homework group; more information on this will be discussed in class.

You will need to use Microsoft Excel for all assignments in this class. UCLA students can download, install and use full versions of Microsoft Office, including Excel, for free. Visit BOL for more information: https://www.it.ucla.edu/news/microsoft-office-proplus.

If you do not have a laptop, but would like to bring one to class in order to participate more fully in the data activities, you can borrow one from UCLA libraries through the CLICC program: http://www.library.ucla.edu/clicc. Please note that the two in-class exams will be held in computer labs -- you can use a lab machine for taking the exam, or can bring a laptop (your own, or borrowed from CLICC). If you plan to bring a CLICC laptop for the exam(s), I strongly encourage you to “test” the service beforehand and get comfortable with the loaner laptops. If this will be a problem for you for any reason, please let me know as soon as possible.

**GRADING:**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework assignments</td>
<td>12 February 7 March</td>
<td>15 points each (total: 30)</td>
</tr>
<tr>
<td>Exams</td>
<td>29 January 21 February Finals week</td>
<td>15 points each (total: 45)</td>
</tr>
<tr>
<td>Participation and engagement:</td>
<td>Throughout</td>
<td>25 points</td>
</tr>
<tr>
<td>• In-class participation (15 points)</td>
<td></td>
<td></td>
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<tr>
<td>• Peer rating of group work (10 points)</td>
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</tbody>
</table>
The summed value of points maps onto final grades as follows: 98-100 = A+, 93-97 = A, 90-92 = A-, 88-89 = B+, 83-87 = B, 80-82 = B-, 78-79 = C+, 73-78 = C, 70-72 = C-, 69 or less = F.

ACADEMIC ACCOMMODATIONS BASED ON A DISABILITY
Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in-person at Murphy Hall A255. When possible, students should contact the CAE within the first two weeks of the term as reasonable notice is needed to coordinate accommodations. If you are already registered with the Center for Accessible Education (CAE), please request your Letter of Accommodation on the Student Portal. If you are seeking registration with the CAE, please submit your request for accommodations via the CAE website. Please note that the CAE does not send accommodations letters to instructors—you must request that I view the letter in the online Faculty Portal. Once you have requested your accommodations via the Student Portal, please notify me immediately so I can view your letter. For more information, visit www.cae.ucla.edu.

ACADEMIC INTEGRITY: (Adapted with permission from Hilary Godwin)
Please visit the UCLA Dean of Students for information regarding academic integrity and the honor code at: http://www.deanofstudents.ucla.edu/Academic-Integrity. You are expected to follow the UCLA Student Conduct Code (http://www.deanofstudents.ucla.edu/Student-Conduct) and the Registrar's Office guidelines (http://www.registrar.ucla.edu/Registration-Classes/Enrollment-Policies/Class-Policies/Plagiarism-and-Student-Copyright). If you are uncertain whether a particular action is in violation of UCLA’s standards of academic integrity or constitutes plagiarism, please err on the side of caution. Contact me if you need further guidance. Ignorance of University policies is not a legitimate excuse for violating them. All violations of academic integrity and plagiarism policies will be referred immediately to the FSPH Dean of Students for review and disciplinary action.

Although you are encouraged to use study groups, worksheets and exams must be in your own words. (Homework assignments will be completed and submitted as a group.)

GROUND RULES AND EXPECTATIONS:
- **Participation**: This class involves a lot of participation and discussion. Many of the topics that we'll discuss do not have a single right answer, but rather are intended to promote critical thinking and discussion. Please be respectful of one another's comments and questions. Data analytics is a team sport! I want this to be a safe space for asking questions and openly sharing ideas. If you have concerns about this, I encourage you to speak with me asap.
- **Attendance**: I look forward to your presence at each class meeting. If an absence is unavoidable, please contact me beforehand. Participation is a significant component of your final grade in this class.
- **Preparation, including careful and thoughtful reading**: You will get more out of this class if you are prepared, which means that you've done the assigned work and given yourself ample time to think about it. Data analytics is not everyone's "native language"
so you may find it helpful to pace your learning each week rather than trying to cram things in.

- **Data use:** The datasets that we will be using for this class have been developed for teaching purposes. They are based on real-world data, but have been fully de-identified and manipulated for educational purposes. The data are not to be shared with others, used outside the context of this class, or cited in any way.

- **Electronics:** Please be mindful of your use of electronics (laptops, tablets, phones) during class. Surfing the web, checking email, etc. can be distracting to you, to other students around you, and to the instructor. All cell phones should be silenced during class. During guest presentations, no electronics should be used unless otherwise instructed.

- **Extensions:** If you need any extensions on assignments, please contact me as early as possible. Note that I will not grant extensions within 48 hours of an assignment due date unless there are extenuating circumstances such as illness or personal emergency. In this case, please contact me as soon as possible.

- **Late policy:** Assignments submitted after the due date and time without an approved extension will be penalized: the grade will be docked by 1 point per 6-hour delay.

- **Evaluations:** Midway through the quarter, we will do a quick informal (and anonymous) evaluation, to see how things are going. We’ll discuss the results in class and I’ll make adjustments accordingly. There will also be an optional weekly poll so you can more rapidly provide feedback. And you are always welcome to speak with or email me with feedback!

Please note that **no food or beverages** can be consumed in the Haines classroom.

Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in person at Murphy Hall A255. When possible, students should contact the CAE within the first two weeks of the term as reasonable notice is needed to coordinate accommodations. For more information visit [www.cae.ucla.edu](http://www.cae.ucla.edu).

**COURSE OBJECTIVES AND COMPETENCIES:**

<table>
<thead>
<tr>
<th>Learning objectives - At the end of this course, students will be able to:</th>
<th>Competencies</th>
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| 1. Learn how data analytics can support a more efficient, more effective, and less expensive health care system. | M.3 and P.3: Apply problem-solving skills to improve functioning of organizations and agencies in public health and healthcare systems  
D1.3: Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population’s health |
| 2. Develop skills in manipulating and analyzing datasets using software (Microsoft Excel, Stata, and/or R, depending on skill level, interest). | D2.3: Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate |
| 3. Learn how to design, interpret and report data analytics results including displays/visualizations. | D2.4: Interpret results of data analysis for public health research, policy or practice |
SCHEDULE OF CLASSES:

*The syllabus and schedule are subject to change by the professor. The latest version of the syllabus will be made available via CCLE.*

<table>
<thead>
<tr>
<th>Week</th>
<th>Tuesday (Haines A44)</th>
<th>Thursday (CHS 43-105)</th>
<th>Friday “Lab” (Powell C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/8 Introduction to class &amp; syllabus Introduction to datasets</td>
<td>1/10 Variables &amp; measures Analysis plans</td>
<td>Excel basics</td>
</tr>
<tr>
<td>2</td>
<td>1/15 Choosing measures</td>
<td>1/17 Missing data &amp; data cleaning</td>
<td>Formulas &amp; functions</td>
</tr>
<tr>
<td>3</td>
<td>1/22 Data cleaning</td>
<td>1/24 Composite indices Guest: Katherine Gilmer (UCLA Health)</td>
<td>PivotTables, charts, slicers, etc.</td>
</tr>
<tr>
<td>4</td>
<td>1/29 <strong>Exam 1 - will be held in Powell Library Classroom C</strong></td>
<td>1/31 Visualizations</td>
<td>Database functions</td>
</tr>
<tr>
<td>5</td>
<td>2/5 Indices Guest: John Tanouye (KP)</td>
<td>2/7 Dashboards &amp; Tableau Mid-quarter evaluation</td>
<td>Viz in Excel</td>
</tr>
<tr>
<td>6</td>
<td>2/12 Visualizations Homework 1 due</td>
<td>2/14 Qualitative data, guest: Marta Bornstein (FSPH, CHS)</td>
<td>Basic statistics</td>
</tr>
<tr>
<td>7</td>
<td>2/19 Working with qual data</td>
<td>2/21 <strong>Exam 2 - will be held in Biomed Library TLC Lab</strong></td>
<td>Linking across sheets/files</td>
</tr>
<tr>
<td>8</td>
<td>2/26 Combining qual &amp; quant</td>
<td>2/28 Interpreting &amp; writing about data, guest: Chad Terhune (Reuters)</td>
<td>No lab</td>
</tr>
<tr>
<td>9</td>
<td>3/5 Writing about data</td>
<td>3/7 Bringing everything together Homework 2 due</td>
<td>Final presentation prep</td>
</tr>
<tr>
<td>10</td>
<td>3/12 Presentation prep Guest speaker: wearables/social network data/etc.</td>
<td>3/14 Presentations Wrap-up Final class evaluation</td>
<td>No lab</td>
</tr>
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</table>

Finals week: **Exam 3 (take-home)**
REQUIRED READINGS & ASSIGNMENTS:
There is no required textbook for this class. I have assigned readings based on the topics we cover each week. Readings are “due” on Thursdays unless noted otherwise below.

<table>
<thead>
<tr>
<th>Week</th>
<th>Required readings</th>
<th>Assignment(s) due</th>
</tr>
</thead>
</table>
| 1    | 10 January (Thursday):  
  Additional optional readings:  
  - Bresnick, “Top 10 Challenges of Big Data Analytics in Healthcare” | None |
| 2    | 17 January (Thursday):  
  Additional optional readings:  
  - (Read through top of page 1018, skim rest) Acock, Working with missing values. Journal of | 19 January (Saturday): Worksheet 1 (optional) |
<table>
<thead>
<tr>
<th>Week</th>
<th>Required readings</th>
<th>Assignment(s) due</th>
</tr>
</thead>
</table>
|      | Marriage and Family, 67(4).  
• TBD readings from guest | 26 January (Saturday): Worksheet 2 (optional) |
| 3    | Optional readings:  
|      | 24 January (Thursday):  
• TBD readings from guest | 2 February (Saturday): Worksheet 3 (optional) |
| 4    | Optional readings:  
<table>
<thead>
<tr>
<th>Week</th>
<th>Required readings</th>
<th>Assignment(s) due</th>
</tr>
</thead>
</table>
| 5    | 5 February (Tuesday):  
  - TBD readings from guest | 9 February (Saturday): Worksheet 4 (optional) |
| 6    | 14 February (Thursday):  
  - TBD readings from guest | 12 February (Tuesday): **Homework 1**  
  16 February (Saturday): Worksheet 5 (optional) |
| 7    | 21 February (Thursday):  
  No readings this week | 23 February (Saturday): Worksheet 6 (optional) |
| 8    | 28 February (Thursday):  
  - TBD readings from guest | 2 March (Saturday): Worksheet 7 (optional) |
| 9    | 7 March (Thursday):  
  No readings this week | 7 March (Thursday): **Homework 2**  
  9 March (Saturday): Worksheet 8 (optional) |
| 10   | 14 March (Thursday):  
  - TBD readings from guest | 16 March (Saturday): Worksheet 9 (optional) |
EXCEL SKILLS-BUILDING
Class assignments (in-class, homeworks, worksheets, and exams) will utilize a set of Excel skills. For students who already have a firm understanding of the techniques we will be learning in class, you may wish to build new skills such as macros and Visual Basic (VBA), or software like Stata or R which are more complex but can be used to accomplish the same tasks as we are learning in class. We are all approaching this with different skill levels and learn in different ways; since I don’t want to be too prescriptive about how or where you acquire these skills, here are some general suggestions.

If you learn by listening/watching, you will find numerous YouTube and other videos online with Excel tutorials. Lynda.com has some excellent videos; members of the Los Angeles Public Library can access Lynda.com for free (http://lynda.com/portal/sip?org=lapl.org) and here are some videos about Excel:

  If you want a refresher on how to use Excel, its structure etc.:
  - Lynda: “Office 365: Excel essential training” various chapters depending on your needs
  - Lynda: “Learning Excel 2016” various chapters depending on your needs
  - Formulas and functions:
    - Lynda: “Excel 2016: Introduction to formulas and functions” Chapters 1 & 2
    - Lynda: “Office 365: Excel essential training” Chapter 3
  - VLookup:
    - Lynda: “Office 365: Excel essential training” Chapter 10
    - Lynda: “Excel 2016: Advanced formulas and functions” Chapter 4
  - Visualizations:
    - Lynda: “Office 365: Excel essential training” Chapter 7
    - Lynda: “Excel 2013: Working with charts and graphs” Chapters 1 and 2
    - Lynda: “Excel 2016: Charts in depth”
  - Pivot tables:
    - Lynda: “Excel: Pivot tables for beginners”
    - YouTube: “World Health Organization data - using a pivot table to make sense of it”
    - Lynda: “Office 365: Excel essential training” Chapter 14
    - Lynda: “Excel 2016: Pivot tables in depth”
  - Macros and VBA:
    - Lynda: “Office 365: Excel essential training” Chapter 15
    - Lynda: “Excel 2016: Macros in depth” (also includes VBA)
  - R:
    - Lynda: “R programming in data science: Setup and start”
    - Lynda: “R for Excel users”
    - Lynda: “R statistics essential training” (also includes viz)
    - YouTube: “R programming for beginners: Statistic with R (t-test and linear regression) and dplyr and ggplot”

If you learn by reading, there are many Excel “textbooks” and I’ve listed a few here that are available as eBooks through UCLA Library: