Course: HPM 441, Data analytics: Identifying, collecting, and analyzing data in healthcare
Term: Spring 2020
Credits: 4

COURSE SYLLABUS

A. Overview

Course Description
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.

Prerequisites
None

Instructor
Corrina Moucheraud
Assistant Professor
Department of Health Policy & Management
UCLA Fielding School of Public Health (FSPH)
Office: 31-235A CHS
Phone: (310) 206-1185
Email: cmoucheraud@ucla.edu

TA: Kat Steeg, katherinesteeg@g.ucla.edu

Class Days, Times, Location

NOTE: Given the 10 March 2020 UCLA policy to switch to online-only education in order to contain the spread of COVID-19, this class will be in virtual format for spring quarter 2020. All content will be asynchronous, so students can complete it on a week-to-week basis at the time of their choosing.

Office Hours

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.

We (Dr. Moucheraud and Kat) will each hold weekly office hours. This is an additional opportunity for you to review and discuss content covered in-class, and/or upcoming assignments. Kat will not discuss specific grades; please use Dr. Moucheraud’s office hours for these queries.

Dr. Moucheraud:
- Zoom "drop-in" hours: Tuesdays 10am-noon
- CCLE “drop-in” hours: Wednesdays noon-2pm
- By appointment: please email me to arrange

Kat:
- Zoom “drop-in” hours: Mondays 11am-1pm, Thursdays 10am-noon
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<table>
<thead>
<tr>
<th>Course Texts</th>
<th>No required textbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Readings</td>
<td>See section E of the syllabus</td>
</tr>
</tbody>
</table>

**Course Format**

This is a hands-on class, so we have to make several modifications in order to accommodate the online-only format.

- There will be short videos posted to CCLE, which you should view each week.
- The videos will include prompts for short exercises, so you can “practice” the concepts presented.
- We will use the CCLE discussion boards to “discuss” the readings.

**Classroom Participation & Attendance**

There is no attendance policy for this class. Participation will be evaluated based on your engagement in the CCLE discussion boards (see below).

**UCLA ADA Policy**

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.

**ADA Contact**

Nickey Woods  
Center for Accessible Education  
A255 Murphy Hall  
Phone: (310) 825-1501  
TTY / TTD: (310) 206-6083  
Fax: (310) 825-9656

**Inclusivity**

UCLA’s Office for Equity, Diversity, and Inclusion provides resources, events, and information about current initiatives at UCLA to support equality for all members of the UCLA community. I hope that you will communicate with me or the TA if you experience anything in this course that does not support an inclusive environment, and you can also report any incidents you may witness or experience on campus to the Office of Equity, Diversity, and Inclusion on their website (https://equity.ucla.edu/).

**B. Learning Objectives**

Council on Education for Public Health (CEPH) areas of foundational knowledge are addressed in this course using the learning objectives listed below along with the assessment that will evaluate students’ attainment of these objectives.
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### CEPH Learning Experiences/Course Learning Objectives

<table>
<thead>
<tr>
<th>Objective</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.3 and P.3: Apply problem-solving skills to improve functioning of</td>
<td>Quizzes, homework</td>
</tr>
<tr>
<td>organizations and agencies in public health and healthcare systems</td>
<td>assignments &amp; exam</td>
</tr>
<tr>
<td>D1.3: Explain the role of quantitative and qualitative methods and</td>
<td>Quizzes, homework</td>
</tr>
<tr>
<td>sciences in describing and assessing a population’s health</td>
<td>assignments &amp; exam</td>
</tr>
<tr>
<td>D2.3: Analyze quantitative and qualitative data using biostatistics,</td>
<td>Quizzes, homework</td>
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<tr>
<td>informatics, computer-based programming and software, as appropriate</td>
<td>assignments &amp; exam</td>
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<tr>
<td>D2.4: Interpret results of data analysis for public health research,</td>
<td>Quizzes, homework</td>
</tr>
<tr>
<td>policy or practice</td>
<td>assignments &amp; exam</td>
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### C. Course Assignments & Exams

All written assignments must be submitted via CCLE, and should be labeled only with your ID number (no names).

**Grading and schedule:**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due date, 6pm on:</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework assignments</td>
<td>HW #1: 12 April</td>
<td>10 points each (total: 50 points)</td>
</tr>
<tr>
<td></td>
<td>HW #2: 26 April</td>
<td></td>
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<tr>
<td></td>
<td>HW #3: 3 May</td>
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<td></td>
<td>HW #4: 24 May</td>
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<tr>
<td></td>
<td>HW #5: 7 June</td>
<td></td>
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<tr>
<td>Exam</td>
<td>17 May</td>
<td>15 points</td>
</tr>
<tr>
<td>Quizzes</td>
<td>Quiz #1: 12 April</td>
<td>6 points each (total: 30 points)</td>
</tr>
<tr>
<td></td>
<td>Quiz #2: 19 April</td>
<td></td>
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<tr>
<td></td>
<td>Quiz #3: 26 April</td>
<td></td>
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<tr>
<td></td>
<td>Quiz #4: 10 May</td>
<td></td>
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<tr>
<td></td>
<td>Quiz #5: 31 May</td>
<td></td>
</tr>
<tr>
<td>Participation on CCLE discussion</td>
<td>n/a (throughout)</td>
<td>5 points</td>
</tr>
<tr>
<td>board</td>
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**Homework assignments**: You will complete 5 homework assignments during the quarter. These are intended to be individual work, so the file you submit should represent your own thoughts and words.

**Exams**: This class will include an exam that is open book/notes/internet – but this is independent work so no consulting or collaborating with anyone (classmates, former students, coworkers, friends, family, etc.). It is an applied exam: you will implement the data analytic tools from classwork and homework. Exams will be administered using files that will be available via CCLE. Exam files are not to be accessed outside of your exam time. If you must reschedule an exam for
any reason, you should not access the exam files (from CCLE, from any of your classmates, from the TA, etc.) until your make-up exam has occurred.

**Quizzes:** There will be quizzes throughout the quarter, to ensure that you are keeping up with the material. Each week when there is a quiz, the content will reflect the readings and videos from that week. The quizzes are open books/notes/internet, but they are time-limited.

**Participation:** Each week, we will have a discussion board on CCLE that includes the guiding questions for that week’s readings as listed in the syllabus. I encourage you to participate in the discussion boards, by posting your thoughts, comments, opinions about these guiding questions and the readings. Remember that it’s about quality, not just quantity!

**Late policy:** Assignments (homeworks, quizzes and exams) submitted after the due date and time without an approved extension will be penalized. Homeworks and quizzes will be docked by 1 point per 4-hour delay. Exams will be docked by 1 point per 30-minute delay.

**Extensions:** If you need any extensions on assignments, please contact Dr. Moucheraud 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.

### D. Course Policies & UCLA Policies

**Message about Academic Integrity to all UCLA Students from UCLA Dean of Students:** UCLA is a community of scholars. In this community, all members including faculty, staff and students alike are responsible for maintaining standards of academic honesty. As a student and member of the University community, you are here to get an education and are, therefore, expected to demonstrate integrity in your academic endeavors. You are evaluated on your own merits. Cheating, plagiarism, collaborative work, multiple submissions without the permission of the professor, or other kinds of academic dishonesty are considered unacceptable behavior and will result in formal disciplinary proceedings usually resulting in suspension or dismissal.

**Forms of Academic Dishonesty:** As specified in the UCLA Student Conduct Code, violations or attempted violations of academic dishonesty include, but are not limited to, cheating, fabrication, plagiarism, multiple submissions or facilitating academic dishonesty:

**Cheating:** Unauthorized acquiring of knowledge of an examination or part of an examination

- Allowing another person to take a quiz, exam, or similar evaluation for you
- Using unauthorized material, information, or study aids in any academic exercise or examination – textbook, notes, formula list, calculator, etc.
- Unauthorized collaboration in providing or requesting assistance, such as sharing information
- Unauthorized use of someone else’s data in completing a computer exercise
- Altering a graded exam or assignment and requesting that it be regraded

**Plagiarism:** Presenting another’s words or ideas as if they were one’s own
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- Submitting as your own through purchase or otherwise, part of or an entire work produced verbatim by someone else
- Paraphrasing ideas, data or writing without properly acknowledging the source
- Unauthorized transfer and use of someone else’s computer file as your own
- Unauthorized use of someone else’s data in completing a computer exercise

**Multiple Submissions:** Submitting the same work (with exact or similar content) in more than one class without permission from the instructor to do so. This includes courses you are currently taking, as well as courses you might take in another quarter

**Facilitating Academic Dishonesty:** Participating in any action that compromises the integrity if the academic standards of the University; assisting another to commit an act of academic dishonesty

- Taking a quiz, exam, or similar evaluation in place of another person
- Allowing another student to copy from you
- Providing material or other information to another student with knowledge that such assistance could be used in any of the violations stated above (e.g., giving test information to students in other discussion sections of the same course)

**Fabrication:** Falsification or invention of any information in an academic exercise

- Altering data to support research
- Presenting results from research that was not performed
- Crediting source material that was not used for research

While you are here at UCLA, if you are unsure whether what you are considering doing is cheating, **don’t take chances**, ask your professor. In addition, avoid placing yourself in situations which might lead your professor to **suspect you of cheating**.

**Alternatives to Academic Dishonesty**

- **Seek out help** – Meet with your professor, ask for assistance as needed.
- **Ask for an extension** – if you explain your situation to your professor, she/he might be able to grant you an extended deadline for an upcoming assignment.
- **See a counselor** at Student Psychological Services, and/or your school, college or department – UCLA has many resources for students who are feeling the stresses of academic and personal pressures.

If you would like more information, please come see us at the Dean of Students’ Office in 1206 Murphy Hall, call us at (310) 825-3871 or visit their website at [www.deanofstudents.ucla.edu](http://www.deanofstudents.ucla.edu).

**Hardware and software:** 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](https://www.it.ucla.edu/news/microsoft-office-proplus)

If you do not have a laptop, you can borrow one from UCLA libraries through the CLICC program: [http://www.library.ucla.edu/clicc](http://www.library.ucla.edu/clicc).
Ground rules & expectations:

- **Participation:** 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 on CCLE. 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.
- **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. 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, or reused or cited in any way.
- **Evaluations:** Midway through the quarter, we will do a quick informal (and anonymous) evaluation, to see how things are going. I will report back to you about these results, and I’ll try to 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!

Due to the COVID-19 emergency and the requisite changes to switch to an online-only format, this course will look quite different than its typical format. It is also a fluid situation so things may change quickly. I will do my best to communicate these changes to you as quickly as possible. Please be attentive to your email for announcements.

Please be patient – with me and with each other -- during this unusual time. I will work hard to be patient and understanding with each of you. Please let me know if you have any concerns or face any specific challenges that I should be aware of.
E. Course Outline

This schedule may change as the quarter progresses

Week 1: 30 March - 5 April
Introduction to the course, syllabus, datasets
Readings:
- (Skim for main messages) Harvard Business Review, "The promise and challenge of big data."
Guiding questions:
- What is the “fundamental objective of healthcare analytics” according to Strome?
- Have you seen analytics at work in any of the applications outlined by Strome?
- What are some of the promises and perils of “big data”? What are some approaches to mitigating these challenges?

Week 2: 6-12 April
Measures and variables
Readings:
- Horton, "Data Analytics": Chapter 14.
- Wheelan, "Naked Statistics: Stripping the Dread from the Data": Chapter 2.
- White, "Analyzing Healthcare Data": Chapter 2 (read p 15-26, skim p26-42 for main messages)
- (Skim for main messages) Centers for Disease Control and Prevention, "Creating an analysis plan."
Guiding questions:
- How valid (using White’s dimensions of validity) are different types/sources of health care data?
- Have you worked with any of these health care data sources? What has been your experience with them?
- How might inclusion and exclusion criteria for analysis affect bias?
- How does the data/variable type (continuous, dichotomous, nominal, ordinal) affect the type of analysis you can undertake?
Assignment(s):
- Quiz #1: due 12 Apr, 6pm
- Homework #1: due 12 Apr, 6pm

Week 3: 13-19 April
Data cleaning & missing data
Readings:
- Bhaskaran and Smeeth, "What is the difference between missing completely at random and missing at random?"
- Van den Broeck et al, “Data cleaning: Detecting, diagnosing, and editing data abnormalities.”
Guiding questions:
- What are some challenges you have encountered (or can imagine encountering) during data cleaning?
- How can we distinguish between inliers and outliers?
- What is the difference between MAR and MCAR, and how can you figure out which one you’re dealing with?
Assignment(s):
- Quiz #2: due 19 Apr, 6pm

Week 4: 20-26 April
Indices & summary measures
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Readings:
- Wheelan, “Naked Statistics: Stripping the Dread from the Data”: Chapter 3.

Guiding questions:
- “A composite indicator is above all the sum of its parts”: what does this mean?
- How should we assess indices?
- Wheelan critiques the U.S. News & World Report ranking of colleges, and in the lecture I discuss a couple of other examples. What composite indicators have you come across that you like (because they are helpful/informative) or dislike (because they are misleading) – or both?

Assignment(s):
- Homework #2: due 26 Apr, 6pm
- Quiz #3: due 26 Apr, 6pm

Week 5: 27 April-3 May
Visualizations
Readings:
- Strome, “Healthcare analytics for quality and performance improvement”: Chapter 10
- Few, S. “Effectively Communicating Numbers: Selecting the Best Means and Manner of Display”
- OPTIONAL: Elliott, K. “39 Studies about human perception in 30 minutes.”
- OPTIONAL: “The 5 Most Influential Data Visualizations of All Time.”

Guiding questions:
- What are the decisions you need to make when choosing how to visually present your data?
- Find an example of a data visualization that you like and think about why it’s compelling to you (form, function, or both).
- Find an example of a data visualization that you dislike and think about how it could be improved (form, function, or both).

Assignment(s):
- Homework #3: due 3 May, 6pm

Week 6: 4-10 May
Dashboards - Guest speaker: John Tanouye, KP South Bay
** NOTE: If you are taking HPM 249 “Telehealth and Technology” with Tanouye, you do not need to view this week’s video as it is a recording of a class session from that course
Readings:

Guiding questions:
- How should KPIs for display on a dashboard be selected?
- How should we judge the visual display of information on a dashboard (its effectiveness, clarity, etc.)?

Assignment(s):
- Quiz #4: due 10 May, 6pm

Week 7: 11-17 May
Exam
Assignment(s):
- Exam: due 17 May, 6pm

Week 8: 18-24 May
Big data in health care - Guest speaker: Eric Braun, KP
Readings:
- TBD
Guiding questions:
- TBD
Assignment(s):
- Homework #4: due 24 May, 6pm

Week 9: 25-31 May
Qualitative data – Guest speaker: Marta Bornstein
Readings:
- Watch: TED Talk, Tricia Wang: The human insights missing from big data
- (Skim for main messages) Maxwell, “Designing a qualitative study”
- OPTIONAL: O'Brien, “Standards for reporting qualitative research: A synthesis of recommendations”
Guiding questions:
- TBD
Assignment(s):
- Quiz #5: due 31 May, 6pm

Week 10: 1-7 June
Student panel - Breezy Lotze, Aubrey Love, Ava Foudeh
Readings:
- Lebied, M. “12 Examples of Big Data Analytics In Healthcare That Can Save People”
Guiding questions:
- Do you agree with the Basic Principles? Do you think the Principles are missing anything important?
- Look at a written presentation of data (e.g., from the newspaper) and assess whether you feel this is an effective write-up. Then use the checklist from Chapter 2 to assess whether the Principles were adhered to. Was the checklist helpful? Did the write-up fall short and if so, where? Did you change your opinion about the write-up?
- Do you agree that it is important to interpret, and not only report, when you write about data? Are there times when just reporting is more appropriate?
Assignment(s):
- Homework #5: due 7 June, 6pm