BIM 105	<b>Probability and Statistics for</b>	David M. Rocke
Fall 2019	<b>Biomedical Engineers</b>	September 26, 2019

# **Course Information**

Class Meetings:	Tu/Th 6:10pm-7:30pm, Olson 206	
Discussion:	A02: Wed 12:10pm-1:00pm, 1116 Academic Surge	
	A03: Wed 1:10pm–2:00pm, 1116 Academic Surge	
	A04: Tue 5:10pm–6:00pm, 1116 Academic Surge	
<b>Office Hours:</b>	Tue & Wed 3:00pm-4:00pm.	
	Other times by appointment.	
Office:	140B Med Sci 1C (752-6999)	
	E-mail: <u>dmrocke@ucdavis.edu</u>	
	Web site: <u>http://dmrocke.ucdavis.edu/</u> (assignments, schedule,	
	announcements, etc.)	
	Canvas site: <b>BIM 105 FQ 2019.</b> This will be used to access the	
	hemowerk accres	
Tort and	Itolliework scores. Statistics for Engineers and Scientists Fifth Edition William	
Software.	Novidi McCrow Hill The book and required web site are	
Soltwale.	available online under the UCD Bookstore inclusive access	
	program (see below) DO NOT BUY A PHYSICAL BOOK	
	MATLAB 2010a (available in the Engineering Computing Lab as	
	well as virtually	
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Course Grading:	Midterm Examination 30%	
	Final Examination 40%	
TT	Homework (see below) 30%	
Homework:	• Each class will have a textbook reading assignment and	
	associated Learn Smart assignment which is graded and	
	Each have seen a content will have an arling accurate	
	• Each nomework assignment will have an online component	
	which is graded and which must be done on the Connect	
	There will also have according to face have been well as the second seco	
	• Incre will also be a component of each assignment that must be handed in on paper in class on the due date	
	<ul> <li>Late assignments will not be accepted</li> </ul>	
Prerequisites	Math 21D (grade C- or better)	
	ENG 6 (may be concurrent)	
Final Exam	December 9, 2019, 8:30pm–10:30pm	

#### **Course Description**

This course is an introduction to probability and statistics as it is used in biomedical engineering. The emphasis is on understanding the methods available and how they are used. Homework assignments will be due weekly and will involve problem solving, conceptual understanding, computations, and some MATLAB work. Some parts of the assignment will be done online, and part turned in on paper. Reading assignments should generally be completed before class. Some material in the reading will not be repeated in class and some material presented in class supplements the reading. If you miss a class, you are responsible for obtaining the notes from another student. Homework assignments will be given weekly—late assignments will generally not be given credit. The midterm examination will be given in class (tentative date: Thursday, October 31) and the final examination will be Monday, December 9, 2019, 8:30pm-10:30pm. Exams will require a calculator.

### Learning Objectives for BIM 105

- This class could be called Data Science for Biomedical Engineers.
  - Biomedical engineering is empirical—if you want to know if something works, you try it.
  - But things don't come out the same every time. If you want to build a stronger engineered cartilage, and you try something new, and you measure the strength, it will vary from try to try.
  - So if you want to know if your new method is better, you have to allow for variability, and that is what we learn how to do.
- We will learn how to take measurements—data—and convert them into knowledge. We first have to make measurements that reflect properties that are important to the engineering objective.
- "...when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of Science, whatever the matter may be." (Sir William Thompson, Lord Kelvin, physics star).
- We will learn that everything varies, that you can't step into the same river twice (Heraclitus).
- We will learn how to see through the variability to make conclusions:
  - How to compare a new method with an old one;
  - How to compare several methods with each other;
  - How to see if changing the temperature, the pressure, or the concentration of a reagent affects the results, and by how much.
- We will learn how to take data, summarize it, graph it, and compute summaries from which we can answer the above kinds of questions, by hand in small problems, and by computer in MATLAB.
- You will need to use methods like these to understand your experiments throughout your career, in the lab and in the field.

#### How to Succeed in this Course

- The textbook is a resource. You should look over the sections to be covered before class—this is encouraged by the LearnSmart component of the homework, which involves answering questions as you go through the text.
- The lectures will always be posted. These are not duplicates of the textbook, though obviously the material overlaps. When you are taking notes, you don't need to write down formulas etc. that are in the lectures, but you should take down the viewpoints presented during the lectures. This is how you learn what is most important.
- The posted lecture notes are not the lectures. They are the skeleton of the lectures, which are fleshed out in class. If you don't come to class, you will often miss important points of emphasis, and that will later cause you trouble.
- Do the homework. Yourself. This consists of two on-line components in Connect and a written component. You may work together, but if you just copy someone else's homework, you won't learn the material, and you will probably do poorly on the exams. If you can do the homework, you can do everything on the exams.
- Ask questions. If there is something in class that you don't understand, ask. If you are working on the homework and don't know quite what to do, then ask in class, come to office hours, or email me.
- If you can't make office hours, just email me and we will schedule a time to talk.
- If you don't do well on the midterm, then talk to me, and we will try to figure out how to do a midcourse correction to improve your chances on the final.
- If you do well on the midterm, don't slack off. The material in the second half of the course is in some ways more complicated than the foundational material in the first half. It is also the most important for your future use in the lab and in the field.
- It is now required by the Campus that all course outlines contain notice of the recently revised Code of Academic Conduct, which may be found at <a href="http://sja.ucdavis.edu/files/cac.pdf">http://sja.ucdavis.edu/files/cac.pdf</a>. Please read this important document.

## **Textbook and Online Homework Resources Required for BIM 105**

You will be **required** to have materials from McGraw-Hill Education which include the CONNECT program needed to complete homework. To reduce your course materials costs, we are participating in the **UC Davis Inclusive Access program** using the Connect interactive online learning platform which includes online homework embedded with the full ebook (Navidi, *Statistics for Engineers and Scientists, Fifth Edition*) at a reduced price of \$99.00.

Note: All enrolled or waitlisted students are automatically included in this program. Please read the following information carefully.

## **ACCESS INSTRUCTIONS:**

- This course uses an educational courseware platform and requires access to the e-text for the course.
- For access, billing, and opt-out info, click on the Bookshelf menu option in Canvas to access your Student IA Portal.
- Follow the access instructions in your portal or email. If an access code is required it will be provided.
- You will have until the 14th day of instruction to opt out of the access if you choose to purchase a print book with access.
- The access charge will be billed to your student account unless you have chosen to opt out by the deadline.
- Please contact <u>inclusiveaccess@ucdavis.edu</u> with questions.

## **BILLING INFO**

• Your access is free for the first 14 days of class, after which the Inclusive Access price will be billed to your MyBill account unless you have chosen to opt out of the program. (info below)