**Astronomy 288A: Practical Astrostatistics**

**Instructor:**

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**Schedule:**

Lectures on Mondays from 4:00-4:50, ATL 1114.

**Textbooks:**

None. We will use my online notes on the website. As appropriate, we will suggest alternate online references.

**Course Grading**

The letter grade you receive in this class will be based on two components:
1. Reading response. I expect you to read the online notes in advance of each class. By 6:00 AM the day of a class, you are to e-mail to me (a) a point in the lecture notes that you understood fully, and (b) a point in the lecture notes that you would like to discuss further. I can't promise to discuss every desired point, but my intent is that by you doing this careful reading, you will have a good chance of absorbing the material in the notes or pointing out ambiguities.

To get full credit on this point, your questions need to be thoughtful. Just saying "I don't understand equation 17" would not give you full credit. What is the problem with equation 17? What parts *did* you understand? The *intent* here is to give you full credit, so make it easier for me by making it clear what you do and don't understand, and that you read the notes carefully!
2. Coding. We'll do some coding in this course, which I hope will help build your understanding of the concepts we discuss. Use any language you like; it will also be helpful to be able to plot results. What I'll do is ask you at the end of one class to write code for the next class. You should read the lecture notes for the class before trying the coding exercise, because in the notes I will often go over a similar example, to get you started.

Your code is due promptly at the start of each class, i.e., at 4:00 PM on the Monday in question. You are to send me the code, along with instructions on how to compile it; you are responsible to ensuring that your code compiles and runs correctly on our departmental machines (this is why you were provided with temporary departmental accounts for this semester). **If your code does not compile and run on my machine, which is a standard departmental machine, you will not give full credit! I will not install anything; your code needs to run out of the box.** I will compile and run your codes to determine whether you solved the exercise correctly. If your code does not compile or does not run, you will receive significant points off. If your code runs but does not give the correct answer, you will have a smaller number of points deducted.

Because this is a one-credit class, my intent will be to give you straightforward coding assignments that you can do easily within a week. There will be no other homework and no exams. Each reading response, and each coding assignment, will be graded on a 10-point scale. I will be perfectly happy to give all of you 10/10 if you have put in the required effort and your codes give the right answers.

**Honor Code**

Standard honor code policies apply to this class. In this case, the material to which the honor code applies is the codes you turn in. Identical codes (to each other, or to material on the Web or other resources) would constitute plagiarism. As usual, feel free to talk with each other as much as you like, and to look up resources as much as you like, but you need to write the codes yourselves. The standard recommendation is: do your writing without looking directly at any particular resource.

If you have a question (for example, about whether you can use a particular subroutine that you have found), please ask me!

**Course content and philosophy**

The content of the class will be flexible, after the introductory set. At the start of the course I have prepared the first seven lectures, with five associated coding exercises (corresponding to classes 2 through 6; no coding for the first day). What we have so far is:

1. Introduction and statistical sins
2. Averages, standard deviations, and so on.
3. Is it Gaussian?
4. Poisson distributions and chi squared.
5. Introduction to Bayesian statistics.
6. Bayesian parameter estimation for discrete distributions.
7. Bayesian parameter estimation for continuous distributions.

We will have room at the end of the course for one or two lectures on statistical topics suggested by enough students.

Fundamentally, the main thing I want you to get from this course is the ability to ask yourself:

**How would I perform my task if I had unlimited time and computer resources**, and then

**How *should* I perform my task given my finite time and computer resources?**

I want you to avoid becoming another astronomer who uses statistical techniques blindly, and who therefore risks producing meaningless results! I look forward to sharing this semester's journey with you.