Nature and aims of the course

The general approach taken in the course is well described by the title of the textbook: *Introduction to the Practice of Statistics*. The course is introductory in that it assumes no prior knowledge of statistics, and has a practical focus on the use of statistical methods in the process of conducting scientific research, rather than on the statistical theory.

The primary aim of the course is for the students to attain full understanding of these few core concepts:

- The logic of statistical inference, particularly the meaning and role of the “sampling distribution” of a statistic, and how this logic fits into the larger process of generating knowledge through scientific research.
- The importance of obtaining good data, and in particular the role of randomization in ensuring that data represent what they are intended to represent.
- The general process of selecting the statistical procedure(s) appropriate to the goals of the study and the characteristics of the data and the study design.

The intended ‘Student Learning Outcomes’ (SLOs) thus are that students can apply the preceding concepts in their research; within this course these abilities will be assessed by having students design studies for and analyze data arising from real-world situations presented to them.

We unavoidably will spend most of our time focussed on specific statistical procedures, and even more specific software implementation of them. After all, students do need to learn what actually to do with their data. Furthermore, encountering a variety of concrete examples is crucial to understanding the three general concepts above; the third one in particular requires learning the relative importance of the various assumptions of particular procedures and how to assess their validity.

The course is introductory in a second sense also: it does not pretend to teach you everything you will ever need to know about statistics, but instead aims to prepare you to continue learning as needed. **Both to properly use the basic tools taught in this course, and to be able to learn new ones as needed, you will need to understand the fundamental concepts.** I will do my best to help you reach this level of understanding.

A note about possible room changes:

The Wednesday 11:30-1:20 and Thursday 3:00-4:50 discussion sections probably will meet in the Webster 101 ‘collaborative classroom’ rather than the rooms shown in the original schedule of courses. I should know about this by the first Wednesday of the semester (26 August).

The Wednesday 3:30-5:20 section will meet in Moore 112 as originally scheduled.
Organizational details
Instructor: Andy Taylor  
taylor@hawaii.edu  
Edmondson 409, x64706  
office hours: WF 10:30-11:30

TA: Kirill Vinnikov  
vinni@hawaii.edu  
Edmondson 418

Course web site: http://www2.hawaii.edu/~taylor/zool631.htm.
Course email list (anyone can send email to it): zool631-l@lists.hawaii.edu

Text: Moore, McCabe & Craig, *Introduction to the Practice of Statistics* (8th ed.)
[earlier editions also can be used]
I also have a student Study Guide to the text, various software guides, and a variety of other introductory texts available for loan. Some of these may be available in the bookstore.

Computing:
You must have a computer with either JMP Pro or Minitab statistical software.
JMP Pro must be version 11 or 12 and must be Pro, not ‘regular’ JMP. It can be purchased for $60 from the UH Site License office (www.hawaii.edu/sitelic/sasjmp/)
Minitab (only for PCs) must be version 14 or newer. It can be purchased for $29.99 at www.onthehub.com/minitab

Students planning to take Advanced Biometry (ZOOL 632) are encouraged to start learning SAS. It is available for free at http://www.sas.com/en_us/software/university-edition.html

Prerequisites:
No prior knowledge of statistics or statistical software is assumed. You should be comfortable with algebra; calculus will not be used but the exposure to mathematical thinking provided by calculus would be helpful.

What we will do and how you will be graded:
• Homework - 20%:
  Weekly assignments, mostly exercises from the text
• Discussions - 40%:
  See below for a description of what will be done in the discussion sessions.
  Write-ups will be due the Monday following the discussion.
  Grading will be based on write-ups and both quantity and quality of participation in class.
• Midterm Exam - 10%:
  In-class exam covering Chapters 2–6. Mid-October.
• Final Exam - 30%:
  Take-home exam covering the entire course. Given out by 9 Dec., due 18 Dec. at noon.
• Study sessions (ungraded): Kirill will hold weekly study sessions, at a time to be determined later (probably Fridays); these will focus on homework assignments.
Discussions:
The discussions are, for most students, the most valuable part of the course because they are the most active and collaborative. To enhance their effectiveness, this year two of the sections probably will meet in the Webster 101 ‘collaborative classroom’; we will try to duplicate the key features of that room in the third section, which will be held in a standard small classroom. Most weeks we will analyze real data sets; some weeks we will discuss designs of studies. Discussions will also be used to address questions about lectures or homework, and to teach the use of software.

Assignments will be distributed in advance. Each student is expected to work on the assignment prior to the discussion class; I recommend that this be done in study groups, but it can be done alone.

What we will do in class:
• Each student will submit a written summary of their work at the start of the discussion session. This should briefly describe how they analyzed the data and what they concluded, or how they would design the study.
• Students will then work in small groups (each table, in Webster 101), discussing their work on the assignment and trying to develop a consensus approach.
• One group (randomly chosen) will then present their work to the entire discussion section, with discussion by all students, and with other groups possibly suggesting alternative approaches.

After the discussion, each student will write up how they would analyze the data and what they conclude from the analysis, or how they would design the study. These write-ups typically will be due the Monday after the discussion, and will be graded. (As noted above, the discussion grades be based on the quantity and quality of participation as well as the quality of these write-ups.)