

# How to Study Statistics

- How should I take notes in class?

When taking notes in class, listen actively *with the intent to learn from the lecture*, and make notes on the slide set you have downloaded and printed from the QA 233 Virtual Classroom website.

- Write down the instructor's explanatory remarks about the problem. Note
    - how to get from one step of the problem to another.
    - particular conditions of the problem.
    - why the approach to the problem is taken.
  - Try to anticipate the next step of a problem and its consequences.
  - Note specific concepts, rules, techniques, problems that the instructor emphasizes.
  - Question your instructor during class about any unclear concept or procedure.
  - If you miss something in the lecture or don't understand what's being presented, then write down what you can catch — especially key words. Leave space so you can fill in the missing material later.
  - Summarize, review, and edit your notes as soon as possible after class.
    - Quickly scan your notes to get an overview of the material and to check for errors and/or omissions.
    - Fill in any information – especially explanatory remarks (see above) – that you did not have time to write down or that the instructor did not provide.
    - Use the margin or the back of the opposite page to summarize the material, list key terms and formulas, and rework examples. You can also use this space to take notes from the textbook.
    - Note any relationship of the lecture material to previous topics, i.e., key similarities and differences between concepts in the new material and concepts in previously covered material.
  - Review your notes regularly with the intent to learn, comprehend, and retain.
- How much time should I budget for studying?

A standard rule of thumb is to devote at least three hours of study time per class hour. Since QA 233 meets for four hours every week, this implies that you should budget approximately twelve hours to study the material in QA 233 every week. Of course, this is not sufficient for some students - you will have to gauge if this is sufficient for you! The decision about how much study time to devote to this course is entirely yours, but I suggest you err on the conservative side when making this decision (i.e., spend more time studying than you think you need). The twelve weekly study hours could logically be partitioned in the following manner:

Read Textbook	1 – 2 hours
Review Notes & Lecture Material	1 – 2 hours
Homework & Case Analyses	9 Hours

- How should I study? What process should I use?

You should find a comfortable and quiet place to study regularly (I like to work with music playing, but this is a distraction for many) where you will not be interrupted or have to deal with minor distractions. You will need

- the Anderson, Sweeney, & Williams textbook;
- a copy of the slide set(s) from the QA 233 Virtual Classroom website;
- pencils and erasers;
- plenty of paper;
- a calculator (you will need to know how to work problems using your calculator on exams); and
- a computer with Microsoft® Excel (you can also use this as a calculator while studying, but you will not have a computer available during exams).

I classify studying for this course into three categories - you should use each type. Understanding the type of studying you are doing will help you determine an appropriate study process for you to use.

- Class Preparation Studying (CPS): Prior to class discussion of a topic, you should
  - *carefully* read the assigned pages in the Anderson, Sweeney, & Williams textbook, and think about potential applications of the statistical methods described in the reading;
  - outline your reading assignment on separate pages, highlighting vocabulary and statistical methods;
  - work example problems by hand (using the calculator or Excel to do simple arithmetic) *in detail* so that you can refer to these notes later or ask your instructor questions when you have difficulty;
  - refer to the corresponding slide set(s) from the QA 233 Virtual Classroom website as you do your reading to integrate these two sources of information;
  - attempt to complete several of the assigned homework problems – again, work these problems by hand (using the calculator or Excel to do simple arithmetic) *in detail* so that you can refer to these notes later or ask your instructor questions when you have difficulty; and
  - have a high tolerance for frustration – some of what you read may be difficult for you to understand, and you should be aware that this is natural (one of my responsibilities as your instructor is to use class time to help you through these difficult areas).
- Class Review Studying (CRS): After to class discussion of a topic, you should

- scan/re-read the assigned pages in the Anderson, Sweeney, & Williams textbook and the corresponding slide set(s) from the QA 233 Virtual Classroom website, again focusing on integrating these two sources of information;
  - review the outline of the reading assignment and completed example and homework problems you developed during CPS sessions – correct your mistakes, errors, and misconceptions and take care to make sure you understand the vocabulary and statistical methods;
  - complete the assigned homework problems – again, work these problems by hand (using the calculator or Excel to do simple arithmetic) *in detail* so that you can refer to these notes later or ask your instructor questions when you have difficulty;
  - complete the additional review problems on the QA 233 Virtual Classroom website – again, work these problems by hand (using the calculator or Excel to do simple arithmetic) *in detail* so that you can refer to these notes later or ask your instructor questions when you have difficulty, then compare your answers to the detailed answers posted on the QA 233 Virtual Classroom website;
  - continue to think about potential applications of the statistical methods you have learned; and
  - have a lower tolerance for frustration – make a list of specific questions and bring them to your instructor’s office during office hours or an appointment.
- Exam Studying (ES): After to class discussion of a topic, you should
- scan/re-read the assigned pages in the Anderson, Sweeney, & Williams textbook and the corresponding slide set(s) from the QA 233 Virtual Classroom website, now focusing on
    - integrating the material from all assigned chapters,
    - applying the statistical methods to various business problems, and
    - identifying circumstances in which the use of various statistical methods are appropriate or inappropriate (i.e., a histogram or bar chart can be used only to display the frequency of occurrence of different groups or classes in a data set).
  - review the outline of the reading assignment and completed example and homework problems you developed during CPS and CRS sessions – correct your mistakes, errors, and misconceptions and take care to make sure you understand the vocabulary and statistical methods;
  - review your completed homework problems complete the additional review problems on the QA 233 Virtual Classroom website; and

- have a very low tolerance for frustration – make a list of specific questions and bring them to your instructor’s office during office hours or an appointment *a few days prior to the exam* (if possible).

You should maintain a neat, meticulous, and well-organized notebook that has divisions by chapter and includes

- a copy of the QA 233 syllabus;
- copies of slide sets from the QA 233 Virtual Classroom website you’re your class notes;
- your written summaries of the assigned pages in the Anderson, Sweeney, & Williams textbook and the corresponding slide set(s) from the QA 233 Virtual Classroom website;
- your completed and corrected example and homework problems;
- your completed review problems from the QA 233 Virtual Classroom website;
- your questions; and
- copies of the exam formula sheets;

Some quick tips/guidelines:

- Studying statistics is different from studying other subjects – it is learned primarily by doing problems, so do the homework contentiously. The problems will help you learn the formulas and techniques you do need to know, as well as improve your problem-solving prowess.
- A word of warning: Statistics is *very cumulative* – each topic builds on the previous topics throughout the quarter. You must keep up with the Instructor: attend class, read the text and do homework every day. Falling a day behind puts you at a disadvantage. Falling a week behind puts you in deep trouble.
- A word of encouragement: Statistics is *very cumulative* – each topic builds on the previous topics throughout the quarter. You are constantly reviewing previous material as you work on new concepts. Identifying and learning the key concepts means you don't have to memorize as much.
- Consider forming a study group of three or four students from your class. Meet once or twice a week (also use the phone) to review problems and concepts that have given you difficulty. You may learn more from your study group than you will from your instructor, the textbook, or the QA 233 Virtual Classroom! And if everyone in your study group is stuck on the same problems, you know it is time to get help from your instructor!
- Apply Pólya's four-step process:
  - The first and most important step in solving a problem is to understand the problem – identify exactly which quantity the problem is asking you to find or solve for (make sure you read the whole problem).
  - Devise a plan – identify which skills and techniques you have learned can be applied to solve the problem at hand.
  - Execute out the plan.

- Reflect - Does your answer seem reasonable? Also review the problem and method of solution so that you will be able to more easily recognize and solve a similar problem.
- Understand that *word problems* are actually *applied problems* and are very relevant to your studies (and are the most interesting and satisfying to solve)! To solve an applied problem:
  - Identify the goal/objective of the problem, the factors that have an effect on how well you can accomplish this goal, and the information provided to you (this step is often the most challenging part of an applied problem).
  - Convert the problem into mathematics. If possible, start by drawing a picture. Label it with all the quantities mentioned in the problem. If a quantity in the problem is not a fixed number, name it by a variable. Then complete the conversion of the problem into math, i.e., find equations that describe relationships among the variables, and describe the goal of the problem mathematically.
  - Solve the math problem you have generated, using whatever skills and techniques you need (refer to the four-step process above).
  - As a final step, you should convert the answer of your math problem back into words, so that you have now solved the original applied problem and those who need the answer can understand your work.
- Some problem-solving strategies to consider include:
  - systematically vary one or more components of a problem with a known solution
  - consider a special case
  - look for a pattern
  - guess and test
  - draw a picture or diagram
  - make a list
  - solve a simpler related problem
  - use reasoning
  - work backward
  - work from the inside (intermediate step) out (to the first and last steps)