



## Course Syllabus Advanced Quantitative Reasoning B

### Course Description

Advanced Quantitative Reasoning B is the second of a two-semester course that is ideal for students interested in non-mathematics-intensive majors in business, social sciences, or the arts at the postsecondary level. Topics include statistics, financial applications, and the use of models from discrete mathematics, algebra, geometry, and trigonometry to solve engaging problems that exist in every-day life. Lessons and activities will focus on exploration-based student learning as well as digital presentation skills.



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Students will complete a variety of graded and ungraded activities including:

- collect numerical bivariate data to create a scatterplot, select a function to model the data, justify the model selection, and use the model to interpret results and make predictions.
- describe the degree to which uncorrelated variables may or may not be related and analyze situations where correlated variables do or do not indicate a cause-and-effect relationship.
- identify limitations and lack of relevant information in studies reporting statistical information, especially when studies are reported in condensed form.
- identify potential misuses of statistics to justify particular conclusions, including assertions of a cause-and-effect relationship rather than an association, and missteps or fallacies in logical reasoning.
- describe strengths and weaknesses of sampling techniques, data and graphical displays, and interpretations of summary statistics and other results appearing in a study, including reports published in the media.
- interpret and compare statistical results using appropriate technology given a margin of error.
- determine the need for and purpose of a statistical investigation and what type of statistical analysis can be used to answer a specific question or set of questions.
- identify the variables to be used in a study.
- determine possible sources of statistical bias in a study and how bias may affect the validity of the results.
- analyze possible sources of data variability, including those that can be controlled and those that cannot be controlled.
- justify the design and the conclusion(s) of statistical studies, including the methods used.
- create data displays for given data sets to investigate, compare, and estimate center, shape, spread, and unusual features of the data.
- identify the population of interest for a statistical investigation, select an appropriate sampling technique, and collect data.
- identify the population of interest for a statistical investigation, select an appropriate sampling technique, and collect data.
- report results of statistical studies to a particular audience, including selecting an appropriate presentation format, creating graphical data displays, and interpreting results in terms of the question studied.
- justify the design and the conclusion(s) of statistical studies, including the methods used.
- communicate statistical results in oral and written formats using appropriate statistical and nontechnical language.
- determine an appropriate linear, exponential, or logistic function that models a situation.
- determine an appropriate cyclical function that models a situation.
- determine an appropriate piecewise function that models a situation.
- use models to make accurate predictions.
- define and recognize various types of income.
- create and analyze mathematical models for income.
- define and recognize various types of expenditures.
- create and analyze mathematical models for expenditures.
- define and recognize loans, investments, and amortization tables.
- create and analyze mathematical models for loans and investments.
- determine the best option for a given situation.



## Course Outline

Each semester course consists of:

- Three units containing a total of 12 lessons;
- Twelve practice quizzes with feedback;
- Twelve graded assignments (8 multiple choice, 4 open-ended); and
- One final exam with 40 multiple choice questions, taken in-person.

## Lesson Components

Each unit contains instruction of concepts in written and video form as well as example problems with solutions, printable note taking guides or reference sheets, key concepts boxes, a glossary, formula sheet and a practice quiz in every lesson.

Technology such as graphing calculators are used throughout the course. Each unit contains video calculator tutorials or step by step instructions on how to use statistical capabilities of the calculator. Each Lesson will contain these “5E” components:

**Engage** – Introduces the topic of study and gives you a sense of why the topic is important.



**Explore** – Try some of the problems in a low-pressure situation. Do you already understand the topic? If your answers are not correct, that’s okay too! This type of pre-work prepares you for what comes next.

**Explain** – Contains *Example* problems and videos or problems showing the step-by-step process. Be sure to take notes, check your answers and if you have questions, review the lesson or ask your instructor.

**Elaborate** – These pages delve more deeply into more challenging problems and discussions.

**Evaluate** – There are two types, graded assignments and ungraded practice quizzes. You can think of ungraded assignments as homework and graded assignments as your tests. Both are important to try your best on. If you don’t practice what you just learned, you will struggle to do well on the graded work and final exams.

## Required Materials

Math Notebook	<ul style="list-style-type: none"> <li>• A small composition notebook or a spiral notebook</li> <li>• Your instructor will instruct you to write in your notebook and upload images from time to time.</li> <li>• Review what you write in your notebook and use it to help you complete graded assignments</li> </ul> 
Free online resources	<ul style="list-style-type: none"> <li>• See the “resource module” located near the beginning of the course.</li> <li>• <i>Introductory Statistics</i> from openstaxcollege.org. Download for free at <a href="https://cnx.org/contents/MBiUQmmY@18.54:2T34_25K@11/Introduction">https://cnx.org/contents/MBiUQmmY@18.54:2T34_25K@11/Introduction</a></li> <li>• <i>Online Statistics Education: A Multimedia Course of Study</i> (<a href="http://onlinestatbook.com/">http://onlinestatbook.com/</a>). Project Leader: <a href="#">David M. Lane</a>, Rice University.</li> </ul>
Pencil or Pen	<ul style="list-style-type: none"> <li>• You must write out the problems to do well in this course.</li> <li>• We recommend pencil so you can erase a small portion rather than re-doing the whole line, but if a pen works better for you, that is fine.</li> <li>• Just remember to keep lots of pens/pencils with you wherever you are when you’re taking the course– at home, the library, or even on-the-go.</li> </ul>
Graphing Calculator	<ul style="list-style-type: none"> <li>• A graphing calculator with statistical capabilities is required.</li> <li>• You are required to bring a graphing calculator to your final exam so it is strongly recommended that you purchase or borrow one for this semester.</li> <li>• Purchasing a TI 84 plus or a similar model is recommended.</li> <li>• Free online calculators are available at <a href="https://www.desmos.com/calculator">https://www.desmos.com/calculator</a> but you may not use these on the exam.</li> </ul> 
Internet Access	<ul style="list-style-type: none"> <li>• Libraries and coffee shops often provide free Wi-Fi access</li> </ul>
Software	<ul style="list-style-type: none"> <li>• Compatible web browser <ul style="list-style-type: none"> <li>◦ <a href="#">Mozilla Firefox</a></li> </ul> </li> <li>• <i>Adobe Reader</i> (or similar) is required to view pdf documents</li> <li>• Some videos in this course require Adobe Flash. Visit <a href="https://utexas.box.com/v/TroublePlayingVideos">https://utexas.box.com/v/TroublePlayingVideos</a> if you need help playing the videos.</li> <li>• A digital camera or scanner is required to upload images of your work. The app <i>Genius Scan</i> is one free option if you use a smartphone.</li> </ul>

## Final Examination

The final examination is comprehensive; it covers the material from all of the units. To pass the course, you must receive a grade of 70 percent or better. You can apply to take the Final Exam after 100 percent of your graded assignments have been submitted, and at least 70 percent have been graded and returned to you.

Format:	40 multiple-choice
Time Allowed:	3 hours
Required Materials:	2 pencils and a graphing calculator

Remember, you must take and pass each semester's final exam to receive credit for the course.

## Need Help?

- Contact your instructor in the Canvas Inbox to ask questions.
- Review previous modules/lessons and re-read and/or re-copy your notes.
- Review all items in the resources module. We recommend you download and print these and keep them in your math notebook or a folder:
  - [formula sheet](#)
    - This is the same formula sheet you will be given on the final exam. You should refer to these formulas often and may use them while completing your course work and assignments.
  - [glossary](#)
    - This glossary contains important vocabulary for semester A concepts.
- Search for the topic in a free online textbook:
  - *Introductory Statistics* from openstaxcollege.org. Download for free at [https://cnx.org/contents/MBiUQmmY@18.54:2T34\\_25K@11/Introduction](https://cnx.org/contents/MBiUQmmY@18.54:2T34_25K@11/Introduction)
  - *Online Statistics Education: A Multimedia Course of Study* (<http://onlinestatbook.com/>).

Project Leader: [David M. Lane](#), Rice University.
- Dr. Math forum—they answer tough questions: <http://mathforum.org/dr.math/>
- Try a web search. For a shortcut from your browser, highlight the word/phrase, then hold down the “ctrl” key while typing the letters “c”, “t”, and “v”.