Quantitative Reasoning I

INF 1130 001

Class Details

Credit Hours: 3

Days Class Meets: Monday, Thursday

Instructor Information

David Ruth
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Required Texts

The Visual Display of Quantitative Information, 2nd Ed.
ISBN: 9781930824133
Authors: Tufte
Publisher: Graphics Pr

Quantitative Reasoning: Thinking in Numbers
ISBN: 9781108419413
Authors: Zaslow
Publisher: Cambridge University Press

Description

The first of a two-course sequence in quantitative reasoning. Topics include interpretation of graphical information, functional notation, patterns, mathematical problem formulation. Throughout the course examples will be drawn from a variety of fields including physics, biology, and economics; there will be particular emphasis on the laws of nature and analogies among them.

Course Outcomes and Objectives

Outcome
Upon successful completion of this course, students will have demonstrated basic achievement in quantitative reasoning.

- Objective: Demonstrate valid reasoning involving basic patterns of change, units, unit analysis, and order of magnitude.
- Objective: Extract information from complicated, quantitative plots and generate written descriptions of the essential information being plotted and what can be concluded from it.
- Objective: Use functions to construct mathematical models of change and magnitude.
- Objective: Perform computational/mathematical tasks involving functions to extract conclusions from models.
- Objective: Identify how content learned in this course enhances your Polaris project.

Grading Policy

Homework and exams will be graded on a 100-point scale, with associated letter grades as follows:

A 100-93	A- 92-90	B+ 89-87	B 86-83	B- 82-80	C+ 79-77	C 76-73	C- 72-70	F <70

The final course grade will be a weighted average of homework and exam grades based on the following weighting:

HW average 25% Mid-term exam 35% Final exam 40%

Accessibility Statement

Please review the University Accessibility Statement in the student catalog. Students having special needs should contact the Polaris Center or email Accomodations@uaustin.org.

Disability Support Services: The university will make reasonable accommodations for students with disabilities in compliance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. The purpose of accommodations is to provide equal access to educational opportunities for eligible students with academic and/or physical disabilities.

Course Requirements

- All students must have a laptop available for use outside of class. Laptops will be used periodically in class at the instructor's discretion.

- You are expected to read supporting material in the textbook. The readings are designed to reinforce concepts presented in class. Reading assignments are annotated on the course syllabus.

- You will turn in homework over the previous seven days each Monday unless otherwise instructed.

- Late assignments will not be accepted unless prior arrangements are made. If you are absent on a collection day, submit your homework the next day you are in class.

- There will be one mid-term and one final exam. Tentative dates are in the course syllabus.

- No makeup exams will be given unless you have a prior excusal or are sick-in-quarters. It is your responsibility to arrange for a makeup exam if required.

Electronics

Use of electronics in INF 1130 is at the discretion of the instructor.

Academic Misconduct

Instructors at UATX have the authority to assess possible plagiarism, unauthorized use of artificial intelligence, and other forms of cheating in their courses. Normally, cheating will result in failing the assignment. Students may appeal such decisions to the Disciplinary Council, where they may exercise their right to a public hearing, by writing to the Dean of the Center responsible for the course.

Attendance and Tardiness Policy

Attendance is mandatory. Each student may have one unapproved absence per course with no penalty. Each additional unapproved absence results in a 2% final grade penalty. Each student may be tardy 1, 2, or 3 times per course per term for a 1.5, 3, or 4.5 credit course, respectively, without penalty. Each additional unapproved late arrival results in a 0.5% final grade penalty. Being more than 25 minutes late to a class counts as an unapproved absence.

Schedule of Class

Mtg	Section/Topic	Reading/Problems
1	Visual displays – graphical excellence	Tufte pp.13-51 HW-L1 problems (H/O)
2	Visual displays – graphical integrity / theory	Tufte pp.53-77, 91-105 HW-L2 problems (H/O)
3	Visual displays – theory (cont’d)	Tufte pp.107-175 HW-L3 problems (H/O)
4	Constructing	Zaslow Ch. 1, Appendix 2.1-2.3

	and evaluating quantitative arguments	
5	Units, dimensions, extensive & intensive quantities	Ch. 4 Zaslow, Appendix 5, HW-L5
6	Quantities, rates	Ch. 3 Zaslow, Appendix 2.4, HW-L6
7	Growth and decay I	Ch. 7 Zaslow, Appendix 6.4, HW-L7
8	Growth and decay II	Ch. 7 Zaslow, Appendix 6.4, HW-L8
9	Interpreting graphs of algebraic and transcendental functions	Ch. 9 Zaslow, Appendix 6.1,6.3, HW-L9
10	Interpreting graphs of parameterized functions	Zaslow, Appendix 8.7, 8.8, HW-L10
11	Review	
12	MID-TERM EXAM	N/A
13	Function applications	Problems: As assigned by the instructor from the problem list (HW-L13). Reading: Instructor's notes; "Functions and graphs", I.M. Gel'fand et al.; (https://www.cimat.mx/~gil/docencia/2012/calculo/functions_and_graphs_gelfand.pdf); Sections 1, 2, 3; more advanced 4, 5, 6, 7
14	Functional operations with computers	Problems: As assigned by the instructor from the problem list (HW-L14). Reading: "Computational mathematics with SageMath", P. Zimmermann et al.; (https://www.sagemath.org/sagebook/english.html); Sections 1.1, 1.2, 2.1; more advanced 3.1, 3.2, 3.3
15	Constructing	Problems: As assigned by the instructor from the problem list (HW-L15).

	functions from data	Reading: Instructor's notes; "Computational mathematics with SageMath", P. Zimmermann et al.; (https://www.sagemath.org/sagebook/english.html); Sections 4.1
16	Multivariate functions	Problems: As assigned by the instructor from the problem list (HW-L16). Reading: Instructor's notes; "Computational mathematics with SageMath", P. Zimmermann et al.; (https://www.sagemath.org/sagebook/english.html); Sections 4.2
17	One of: effects of policing / beauty and teaching evaluations / Astronaut data / ERCOT power demand – Interactive session	Reading: To be provided. Problem: Respond to prompt with prose and up to two figures that corroborate your argument.
18	One of: effects of policing / beauty and teaching evaluations / Astronaut data / ERCOT power demand – Interactive session	Reading: To be provided. Problem: Respond to prompt with prose and up to two figures that corroborate your argument.
19	Review	
20	FINAL EXAM	