

# Reasoning With Numbers

(PHIL 135-01; 15223)

C S U Northridge

Term: Fall 2025

Time: M/W 1:00–2:15

Room: Extended University Commons 132

Instructor: John Birmingham, Ph.D.

Office: Sierra Tower 531

Office Hours: T 1–2:20; W 12–12:50

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Department Office: 818-677-2757

## Catalog Description

How is our everyday understanding of the world shaped by our encounters with data? How do you calculate a risk? Can numbers lie? This course is a critical assessment of the uses and misuses of numbers in popular media and everyday life. Students will learn how to handle quantitative data visually and creatively and will practice critical reasoning to assess how the language of math can be used to inform and mislead. Special attention is paid to quantitative and statistical reasoning in media, politics, health, and finance. (Available for General Education, Basic Skills B4 Mathematics and Quantitative Reasoning.)

## Student Learning Outcomes

By the end of the semester, students will accomplish the following:

1. Represent, understand, and explain mathematical information symbolically, graphically, numerically, and with spoken or signed language.
2. Develop mathematical models of real-world situations and explain the assumptions and limitations of those models.
3. Use models to make predictions, draw conclusions, check whether the results are reasonable and find optimal results using technology when necessary and appropriate.
4. Demonstrate an understanding of the nature of mathematical reasoning, including the ability to prove simple results and/or make statistical inferences.

## Course Description

To accomplish the goals mentioned above, we will use the techniques of elementary algebra, geometry, probability, and statistics to construct and evaluate mathematical models to solve real-world problems. Throughout the course, our focus will be on the tools necessary to develop and assess such models. As a result, we will concentrate more on how to reason *with* numbers than how to reason *about* them.

## Textbooks

**Note:** Neither of the following texts can be found in the CSUN Bookstore. They are free online:

- *Basic Mathematics for College Students*, 4th ed., by Tussy, et al. An online pdf can be found [here](#).
- *A Concise Introduction to Logic*, by Patrick J. Hurley. An online pdf can be found [here](#).

## Contact Information and Tech Support

• My **office hours** during the Fall 2025 semester will be Tuesday 1:00–2:20 and Wednesday 12:00–12:50 (in ST 531 both days). In addition, you can contact me any time at the email address below if you have questions about the course content.

- Occasionally, I will post announcements. You can view them in the **Announcements** thread at the top of the **Homepage** on our Canvas website.
- I will also post your grades so that you can view them anytime by clicking on **Grades** in the Navigation Bar to the left of the **Homepage**. Be sure to check them periodically and contact me immediately if there are any mistakes.
- I can be reached at [john.birmingham@csun.edu](mailto:john.birmingham@csun.edu) for any questions you have about the course. Be sure to tell me in the email which course you are taking. I will do my best to respond to emails within forty-eight hours (except on Saturdays and Sundays). Please restrict your inquiries to questions not already answered in the **Syllabus**. Otherwise, you should not expect a response.
- Please do *not* contact me for tech support. Instead, contact the **IT Help Center** at 818-677-1400 or online [here](#).

## Time Commitment

This is a full semester, three-unit course. For the readings and the homework, you will be required to navigate through the material largely on your own—though, of course, you’re encouraged to ask questions (in class, during office hours, or by email) about anything you’re having difficulty with. You will be required to keep track of deadlines and pace yourself appropriately. Also, the material can be quite difficult. It involves a great deal of very careful analysis and precise evaluation. But for those willing to put forth the effort, it is certainly doable. To do it well, however, you should expect to spend *at least* six hours per week on average (including class time).

## Course Structure and Content

Here is a short outline of the course (with readings).

### 0. Introduction

#### 1. Algebraic Reasoning

- 1.6 Problem Solving [68–75 in Tussy, *et al.*]
- 8.1 The Language of Algebra [637–44 in Tussy, *et al.*]
- 8.2 Simplifying Algebraic Expressions [648–55 in Tussy, *et al.*]
- 8.3 Solving Equations Using Properties of Equality [658–65 in Tussy, *et al.*]
- 8.4 More about Solving Equations [668–73 in Tussy, *et al.*]
- 8.5 Using Equations to Solve Application Problems [675–82 in Tussy, *et al.*]

**\*\*\* 1ST EXAM (9/18) \*\*\***

#### 2. Geometric Reasoning

- 9.1 Basic Geometric Figures; Angles [712–20 in Tussy, *et al.*]
- 9.2 Parallel and Perpendicular Lines [721–31 in Tussy, *et al.*]
- 9.3 Triangles [736–41 in Tussy, *et al.*]
- 9.4 The Pythagorean Theorem [747–51 in Tussy, *et al.*]
- 9.7 Perimeters and Areas of Polygons [777–86 in Tussy, *et al.*]
- 9.8 Circles [792–97 in Tussy, *et al.*]

**\*\*\* 2ND EXAM (10/16) \*\*\***

### 3. Probabilistic Reasoning

- 11.1(a) Theories of Probability: Classical Theory [554–56 in Hurley]
- 11.1(b) Theories of Probability: Relative Frequency Theory [556–57 in Hurley]
- 11.1(c) Theories of Probability: Subjectivist Theory [557 in Hurley]
- 11.2(a) The Probability Calculus: Restricted and General Conjunction Rules [557–60 in Hurley]
- 11.2(b) The Probability Calculus: Restricted and General Disjunction Rules [560–62 in Hurley]
- 11.2(c) The Probability Calculus: Negation Rule and Bayes's Theorem [562–65 in Hurley]

\*\*\* 3RD EXAM (11/13) \*\*\*

### 4. Statistical Reasoning

- 12.1 Evaluating Statistics [571–72 in Hurley]
- 12.2 Samples [572–76 in Hurley]
- 12.3 The Meaning of *Average* [576–78 in Hurley]
- 12.4 Dispersion [578–83 in Hurley]
- 12.5 Graphs and Pictograms [583–86 in Hurley; also, Read Circle Graphs, 598–99 in Tussy, *et al.*]
- 12.6 Percentages [586–87 in Hurley]

\*\*\* FINAL EXAM (12/17) \*\*\*

## Assignments and Grading

There are three types of graded assignments in this course: homework, exams, and a cumulative quiz. The homework will be submitted online in Canvas. Grades can be checked at any time by clicking on **Grades** in the Navigation Bar to make sure the assignments have been submitted properly and graded. If there is any discrepancy, be sure to contact me at once.

- **Homework** (5 points each, for a total of 50 points) to be submitted on Canvas. I will assign it regularly. The exercises and solutions for each assignment will be posted on Canvas after the homework is due
- **Three Midterm Exams** (25 points each) on 9/18, 10/16, and 11/13. Each exam will be short answer, non-cumulative, and emphasize reasoning skills as well as factual knowledge. **I will drop your lowest score.**
- **Cumulative Quiz** (10 points **extra credit**). A short, objective quiz over the basic content of the course. It will be available, along with the final exam, during the final exam period.
- **Final Exam** (25 points) To be taken on Wednesday, December 17 from 12:45–2:45 pm. It will cover material introduced after the third midterm and emphasize reasoning skills as well as factual knowledge. It, too, will be short answer and non-cumulative.

## Grading Standards

| Final %      | 93↑ | 90-92.9 | 87-89.9 | 83-86.9 | 80-82.9 | 77-79.9 | 73-76.9 | 70-72.9 | 67-69.9 | 63-66.9 | 60-62.9 | 59.9↓ |
|--------------|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| Letter Grade | A   | A–      | B+      | B       | B–      | C+      | C       | C–      | D+      | D       | D–      | F     |

## Late Policy and Drops

Each homework assignment has a specific due date and time **that cannot be violated**. No make-ups will be allowed. The same is true for the Cumulative Quiz and the Final Exam. However, if you miss one of the midterms, you can take a make-up for it by arranging with me to take it during my office hours. Missing multiple assignments can result in being dropped from the course, so make sure you keep up.

## Regulations

### General Course Policies

1. *Email*: Please include the course number and day/time in all correspondence.
2. *Assignments*: Must be completed on time unless other arrangements have been made with me *before* the due date.
3. *Inactivity*: You may be dropped from the course due to inactivity or uncompleted assignments. If you fail to meet mandatory deadlines, and/or are inactive for more than one full week, your overall performance will be assessed and you may be dropped.
4. *Drops*: You are responsible for dropping yourself from the course.
5. *Discipline*: Consult the University's policies on cheating, plagiarism, and classroom behavior. In addition, anyone caught cheating or plagiarizing on any assignment will, at the very least, receive a zero for that assignment and, possibly even be expelled from the school. Honesty is the best policy! Those who abide by these regulations will reap the benefits of their good behavior.

### Use of Artificial Intelligence

The following is our course policy on AI:

- No answers generated by any AI tool—such as ChatGPT—are acceptable for any assignment.
- If you use text generated by AI on any assignment, I will treat it as a case of plagiarism (see below).
- The immediate penalty for using text generated by AI is an automatic 0 for the assignment. **FAIR WARNING**: I have access to software that detects AI-generated text.
- For other potential forms of discipline, see above.

### Plagiarism

Plagiarism is the act of presenting someone else's work as one's own. Examples include

- Copying and pasting text from websites or other electronic sources and presenting it in an assignment as your own original work
- Copying and pasting text from printed sources (including books, magazines, encyclopedias or newspapers) and presenting it in an assignment as your own work
- Using another student's work and claiming it as your own original work (even if you have the permission of the other student)

### Cheating

Cheating is the act of pretending (or helping others to pretend) to have mastered course material through misrepresentation. Examples include:

- Copying in whole or in part from another student's test or paper
- Allowing another student to copy from your test or assignment
- Using the textbook, course handouts, or notes during a test without instructor permission
- Stealing, buying, or otherwise obtaining all or part of a test before it is administered
- Selling or giving away all or part of a test before it is administered
- Having someone else attend a course or take a test in your place
- Attending a course or taking a test for someone else
- Failing to follow test-taking procedures, including talking during the test, ignoring starting and stopping times, or other disruptive activity
- Using artificial intelligence (AI) to generate content and presenting it as your own

**Fabrication**

Fabrication is the intentional use of invented information. Examples include:

- Signing a roll sheet for another student
- Giving false information to college personnel
- Answering verbal or written questions in an untruthful manner
- Inventing data or sources of information for research papers or other assignments; this includes the use of false information provided by artificial intelligence (AI) generators

As members of the CSUN learning community, students are not to engage in any form of academic dishonesty. Any act of academic dishonesty will be considered a very serious offense that is subject to disciplinary action, such as dismissal from the course, failure for the course, academic suspension, etc.

**Important Dates**

The CSUN Academic Calendar for Fall 2025, including all important dates, can be found [here](#).

**Possible Amendments**

I reserve the right to change this syllabus, with fair warning, at any time.