Welcome to Math 50!

For all course information see
`https://elevien.github.io/Math50_2024`.

Not registered? Fill out form linked on course website (no need to email unless you have specific questions)

Math 50 is about:

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- How do we determine if two variables are related? How can we understand the underlying source of this relationship?
- When can we make predictions about data we have not seen?

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- Not stats background is needed (e.g. can skip Math 10), but it might be helpful.
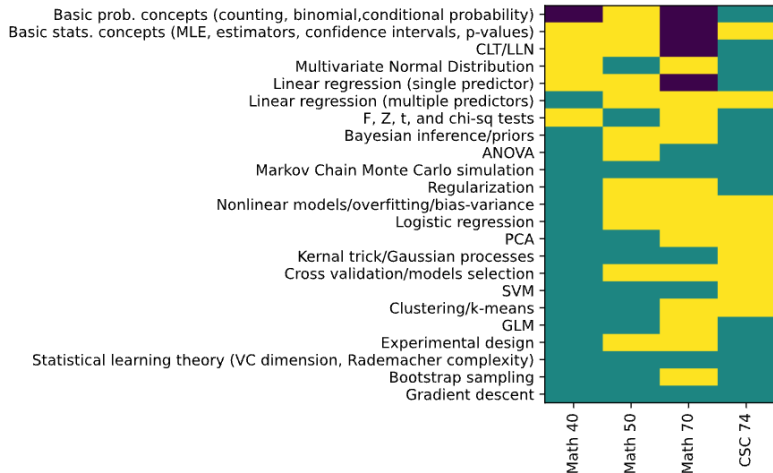
Comparison to other courses

Figure: Topics covered in similar Dartmouth courses – work in progress
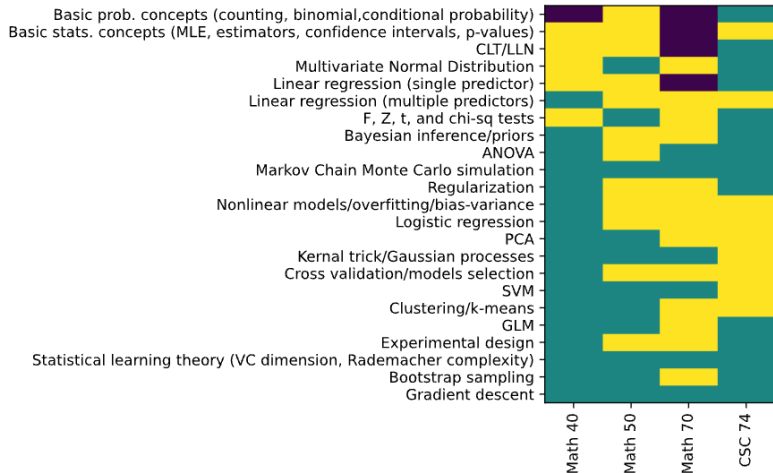
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Lot's of overlap, but key differences

- **Math 40:** Deeper dive into basics. More rigorous math, less coding. More advanced than **Math 10**.
- **Math 70:** Requires 40. More broadly focused on multivariate stats (including clustering, PCA). Less emphasis on computational/coding, hands on examples.
- **Math 74:** Less probabilistic focus, more broadly focused on ML methods (including kernel methods and SVM). More focus on prediction vs. inference.
- First two weeks of 50 also overlaps with **Math 20** and **Math 60**.

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For MDS, but take 40,70 and 50. 40 before 70.

In addition to the specific topics mentioned above, there are some general themes which will guide how we explore the world of regression modeling

- **Correlation vs. causation:** When can we tell the difference?
- **Bayesian vs. frequentist:** Different ways of seeing the same thing?
- **Classical statistics vs. machine learning:** Is statistics "just" machine learning?
- **Experimental mindset:** Learn by running computational experiments rather than doing complex mathematical calculations

Course structure

Class time:

- **Lecture:** Usually Monday/Wednesday. **No phones or computers please!**

- **Hands on coding:** Usually Friday, sometimes Wednesday, bring laptop, or tablet, but don't need to – see schedule for which day.

- **Exams:**
    - Midterm Wednesday October 16 during class
    - Final Friday November 22 11:30 (Section I) and Monday November 25 8:00am (Section II)

  Midterm and Final in class.

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Outside of class:

- Readings ≈ 3-4 hours/week.
- Supplemental resources (e.g. videos) ≈ 1 hours/week
- Practice/reflection (HW, practice problems, practice exams) ≈ 5-8 hours/week

How to succeed in this course

- **Do the readings:** Don't just read, ask yourself questions, work through examples, try to challenge claims make in the text.
- **Come to class:** Don't look at your phone during class. Ask questions.
- **Come to office hours:** Helpful if you have concrete questions, but okay if not.
- **Have an open mind:** Just because you've seen something in a different course doesn't mean you won't benefit from thinking deeply about it again.

What to expect from me

- **Availability:** Office hours and xhours (4 hours total outside of class available to both sections).
- **Responsiveness:** I will respond in 24 hours on weekdays.
- **Material:** Notes to supplement the textbook.