BILL, RECORD LECTURE!!!!

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Today:
Admin,
Ramsey Theory and Its "Applications"

Admin

Necessary Administrative

Everything in these slides is also on the written syllabus on the course website.

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Course Webpage:
https://www.cs.umd.edu/users/gasarch/COURSES/752/S26/index.html

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1. Taught by William Gasarch. Tu-Th 3:30-4:45 in IRB 2107.
2. TAed by Javier Marinkovic.

Necessary administrative stuff

- Course Website: Will post slides, notes, and HW there.
- Elms: will post recording.
- Gradescope: you will **submit HW** there.
- Gradescope: we will **grade HW** there.
- Regrade requests due within a week of the HW being graded.
- Piazza is great for asking questions.

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IF you are auditing this class for whatever reason- perhaps you are having a hard time getting permission to take it, or perhaps you like the material but don't want to take it, let me know and I will put you on the class email list and invite you to join the Piazza.

How to Ask Questions

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- Appointments (possibly on zoom, possibly at night)

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- There may be some short programming project. (This is **not** a course like **CMSC 412** where the project IS the course.)

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   - 3.4 In Spring of 2025 recording failed 3 times. One was my fault, two were not my fault.
   - 3.5 There will be some in-class problems which count for the final grade.

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- There will be one in-class midterm, one take home final.

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Bill I am not sure why you are telling me about **time stamps**, but, as the kids say, whatever.

Homework: ChatGPT Policy

You can use **ChatGPT policy** but

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5. **Upshot** If a problem is standard then ChatGPT will prob get it right, but so will you. If a problem is non-standard then ChatGPT will hallucinate.
6. This class is rather non-standard.

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   The most common is that you both made some mistake that nobody else made. If we know this we can discuss and enlighten you!

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2. **Recommend** Make sure you understand what you are handing in.
3. If not you will crash and burn on the written exams.

Textbook

Required or Recommended Text None.

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There are actually **three** textbooks on Ramsey Theory.

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Why?

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That might be a harder question then improving the bounds on $R_2(k)$.

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For this course there will be notes, slides, and recordings of lecture.

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If **for whatever reason** you are falling behind in the class, or are having trouble with the HW, see us in office hours or **you can make an appointment to see us!** Either in person or on zoom.

Why People Are Taking This Course-Part I

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Here is a sample of reasons and my comments on them:

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SOMETIMES TO RAMSEY THEORY ITSELF.

Ramsey Theory and its "Applications"

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Thm For all functions $\mathrm{COL}\colon \binom{[6]}{2} \to [2]$ there exists $A \subseteq [6]$, $|A| = 3$, such that $\mathrm{COL}\colon \binom{A}{2}$ is constant.

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Def Let $a, n \in \mathbb{N}$ and $A \subseteq \mathbb{N}$.

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2. $\binom{A}{a}$ is the set of all a-sized subsets of A.

Thm For all functions $\mathrm{COL}\colon \binom{[6]}{2} \to [2]$ there exists $A \subseteq [6]$, $|A| = 3$, such that $\mathrm{COL}\colon \binom{A}{2}$ is constant.

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Examples Stated Several Ways

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Ramsey's Thm for 2-col Graphs $\forall k \; \exists n = R(k)$ such that the following happens: For all $\mathrm{COL}: \binom{[n]}{2} \to [2]$ there exists $A \subseteq [n]$, $|A| = k$, such that $\mathrm{COL}: \binom{A}{2}$ is constant.

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Van der Waerden's Thm for 2-coloring of $\mathbb{N}$ For all k there exists $W = W(k)$ such that the following happens: For all $\mathrm{COL}\colon [W] \to [2]$ there exists a mono k-AP.

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