BILL, RECORD LECTURE!!!!

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Today: Admin, Ramsey Theory and Its "Applications"

Admin

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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/S25/
index.html

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

2. TAed by Adam Melrod and Isaac Mammel.

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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- Piazza is great for asking questions.

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.

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Ask questions in lecture



- Ask questions in lecture
- Ask questions on piazza

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Office hours

 Ask questions in lecture
 Ask questions on piazza
 Office hours Bill: Tu-Th 12:30-3:15 in IRB 2242. Isaac: TBD Adam: TBD

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- Ask questions in lecture
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- Office hours Bill: Tu-Th 12:30-3:15 in IRB 2242.
 Isaac: TBD Adam: TBD
- Email us- put 752 in the subject line.
 Bill: gasarch@umd.edu or (301) 503-3157.
 Adam: abmelrod@terpmail.umd.edu
 Isaac: imammel@terpmail.umd.edu

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- Appointments (possibly on zoom, possibly at night)

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Combinatorics.

Mathematical maturity.

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Combinatorics.

- Mathematical maturity.
- Ability to write proofs.

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Combinatorics.

- Mathematical maturity.
- Ability to write proofs.
- 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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 - 3.3 I sometimes use the whiteboard—not recorded.

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 - 3.4 In Spring of 2024 recording failed 3 times.

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 - 3.1 You can ask questions.
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 - 3.3 I sometimes use the whiteboard—not recorded.
 - 3.4 In Spring of 2024 recording failed 3 times. One was my fault, two were not my fault.

HWs most weeks.



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Due Tuesday before class begins. But see next item.

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- We will use the term Morally Due for the Tuesday, but it is known that via dead cat you can hand it in Thursday. BILLgive your thoughts on correlation between morality and grades.
HWs and Exams

- HWs most weeks.
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- We track of your morality NOT for grade, but for letters of recommendation and for laughs.
- We will use the term Morally Due for the Tuesday, but it is known that via dead cat you can hand it in Thursday. BILLgive your thoughts on correlation between morality and grades.
- There will be one take home midterm, one take home final.

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Will need student to play-act.

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Student I submitted it **Thursday** at midnight thinking it was due then, and not at 3:30PM. Can it still count?

Will need student to play-act.

Student I submitted it **Thursday** at midnight thinking it was due then, and not at 3:30PM. Can it still count? **Bill** Oh, so you submitted it **Tuesday** at midnight, then realized that the Dead-Cat Policy saved you. You are telling me that you **appreciate** the Dead-Cat Policy!

Will need student to play-act.

Student I submitted it Thursday at midnight thinking it was due then, and not at 3:30PM. Can it still count?Bill Oh, so you submitted it Tuesday at midnight, then realized that the Dead-Cat Policy saved you. You are telling me that you appreciate the Dead-Cat Policy!

Student Oh, I forgot to hand it in on **Thursday at 3:30** but I can prove I did it on time because my computer time stamps my work.

Will need student to play-act.

Student I submitted it **Thursday** at midnight thinking it was due then, and not at 3:30PM. Can it still count? **Bill** Oh, so you submitted it **Tuesday** at midnight, then realized that the Dead-Cat Policy saved you. You are telling me that you **appreciate** the Dead-Cat Policy!

Student Oh, I forgot to hand it in on **Thursday at 3:30** but I can prove I did it on time because my computer time stamps my work. **Bill** Oh, so you forgot to hand it in **Tuesday at 3:30**, then realized this, got it in on Thursday before 3:30. You are telling me that you **appreciate** the Dead-Cat Policy!

Will need student to play-act.

Student I submitted it **Thursday** at midnight thinking it was due then, and not at 3:30PM. Can it still count? **Bill** Oh, so you submitted it **Tuesday** at midnight, then realized that the Dead-Cat Policy saved you. You are telling me that you **appreciate** the Dead-Cat Policy!

Student Oh, I forgot to hand it in on Thursday at 3:30 but I can prove I did it on time because my computer time stamps my work.
Bill Oh, so you forgot to hand it in Tuesday at 3:30, then realized this, got it in on Thursday before 3:30. You are telling me that you appreciate the Dead-Cat Policy!
Bill I am not sure why you are telling me about time stamps, but, as the kids say, whatever.

You can use ChatGPT policy but



You can use ChatGPT policy but

1. You must tell me that you did.

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You can use ChatGPT policy but

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This will explain why what you handed in is so bad that no human would ever have written it.

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2. You must rewrite and hand it your own work.

You can use ChatGPT policy but

- You must tell me that you did. This will explain why what you handed in is so bad that no human would ever have written it.
- 2. You must rewrite and hand it your own work.
- 3. **Recommend** If you use it, read what it outputs and make sure its correct (it won't be), well written (it won't be), and that you are enlightened (you won't be).

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4. Recommend Don't use it.

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- 4. Recommend Don't use it.
- 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.

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- 4. Recommend Don't use it.
- 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.

You can discuss HW with Humans but hand in your own work.

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1. You must tell me that you did and who you got help from (if its a student in the class).

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You can discuss HW with Humans but hand in your own work.

1. You must tell me that you did and who you got help from (if its a student in the class).

This will explain why what you handed in looks like what they handed in.

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You can discuss HW with Humans but hand in your own work.

- 1. You must tell me that you did and who you got help from (if its a student in the class).
 - This will explain why what you handed in looks like what they handed in.
 - The most common is that you both made some mistake that nobody else made. If we know this we can discuss and enlighten you!

You can discuss HW with Humans but hand in your own work.

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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!

2. **Recommend** Make sure you understand what you are handing in.

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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.

Required or Recommended Text None.



Required or Recommended Text None.

There are actually three textbooks on Ramsey Theory.

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Required or Recommended Text None.

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

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Required or Recommended Text None.

There are actually three textbooks on Ramsey Theory.

Why?

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



Required or Recommended Text None.

There are actually three textbooks on Ramsey Theory.

Why?

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

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

You are INVITED to talk to us

It has been said that some students do not seek help because they do not know they can.

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It has been said that some students do not seek help because they do not know they can.

You Can!



It has been said that some students do not seek help because they do not know they can.

You Can!

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.

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

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To learn more combinatorics or graph theory

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To learn more Ramsey Theory. MORE RAMSEY THEORY?
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To learn more Ramsey Theory. MORE RAMSEY THEORY?

Heard its interesting.

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

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Heard that bill is awesome.

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Heard its interesting. I"VE HEARD THAT TOO.

Heard that bill is awesome. TELL ME In MAY IF THIS WAS TRUE.

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All the cool kids are taking it!

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All the cool kids are taking it! DOES THAT MAKE ME COOL TOO?

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It satisfies a requirement, but also one of the above.

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It satisfies a requirement, but also one of the above. FINE, BUT I HOPE THAT YOU ALSO LIKE IT.

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To expand my knowledge of Computer Science.

To expand my knowledge of Computer Science. UM- THIS IS MORE OF A MATH COURSE.

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I enjoyed 451 and wanted to take another theory course.

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Patterns in Ramsey Theory can be applied to data clustering, anomaly testing, etc..

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I am looking forward to the applications.

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WHICH ARE MOSTLY TO OTHER PART OF PURE MATH. SOMETIMES TO RAMSEY THEORY ITSELF. Ramsey Theory and its "Applications"

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Thm At any party with 6 people there is a set of 3 people such that either (a) they all know each other, or (b) they all do not know each other.

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

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Thm For all 2-colorings of [35] there exists a mono 4-AP.

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 COL: $[W] \rightarrow [2]$ there exists a mono k-AP.

Theme of Ramsey Theory

If you color a big-enough structure there will be a monochromatic sub-structure.

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Complete Disorder is Impossible!

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 - to other parts of pure math, to TCS,
 - to math competitions (I'm on the UMCP HS Math Competition Committee.)

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