

BILL, RECORD LECTURE!!!!

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**Today:
Admin,
Intro to Theory of
Computation**

Admin

Necessary Administrative

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

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<https://www.cs.umd.edu/users/gasarch/COURSES/452/S25/index.html>

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1. Professor: William Gasarch.
2. Time: Tu-Th 11:00-12:15.
3. Place: IRB 1116.
4. TAed by
Cheng-Yuan 'Sam' Lee,
Danesh Sivakumar,
Leo Paranhos.

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.
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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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Bill: Tu-Th 12:30-3:15, 2:00-3:15 in IRB 2242.

Sam: TBD

Danesh: TBD

Leo: TBD

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- ▶ Email us- put 452 in the subject line.

Bill: gasarch@umd.edu *Phone (301) 503-3157*

Sam: c1571128@terpmail.umd.edu

Danesh: dsivakum@terpmail.umd.edu

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- ▶ Appointments (possibly on zoom, possibly at night)

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- ▶ Discrete math, modular arithmetic, algorithms, misc math.
- ▶ Mathematical maturity.
- ▶ Ability to write **short** proofs. (This is not a course like **MATH410** where the point is RIGOR.)
- ▶ There will be one short programming project. (This is **not** a course like **CMSC 412** where the project IS the course.)

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BILL- give thoughts on correlation between morality and grades.

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6. **BILL**- tell class about how it failed on non-reg, Muffins, Grid Colorings.

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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.

Dead Cat Policy Stories

What you say, what I hear:

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

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BILL- give thoughts on how the project has worked out.

Textbook

Required Text None.

Recommended Text None.

If you really want a text then buy used (cheap) or borrow:

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If you really want a text then buy used (cheap) or borrow:

Introduction to The Theory of Computation by Michael Sipser

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There will be notes, slides, and recordings of lecture online.

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Elementary Theory of Computation

Our Key Question

Given a problem, **classify** how hard it is.

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This question permeates all branches of mathematics and computer science.

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Example: Gauss invented the Fast Fourier Transform but never told anyone since he did not think it was that important.

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Example: $2^{1/3}$ is not the root of any quadratic over \mathbb{Z} .

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3. There is no set of axioms from which one can derive all the truths of arithmetic. (Godel's Incompleteness Theorem, 1933.)

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6. HALT is undecidable (Turing, 1950's.)

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5. We will define problems that are HARDER THAN HALT.

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