Welcome to CMSC/MATH/ENEE 456: Cryptography

Today: Admin, Intro to Crypto, Shift Cipher

BILL, RECORD LECTURE!!!!

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Admin

Necessary Administrative

Course Webpage:
https://www.cs.umd.edu/users/gasarch/COURSES/456/F21/index.html

Gradescope

- **Submit HW**
- **Submit Midterm**
- **Submit Final**
- **Submit Optional Project**
- **Look for Grades**
- **Make regrade requests** within a week of the HW being graded.

Course Website

- **Syllabus**
- **Slides**
- **Homework**
- **Notes** (not much)
- Pointer to **University Policy**
- **Books of interest**
- Pointer **Fall 2020 version of this course**

ELMS

- Recordings of Lecturers (I hope)

Teacher and TAs

Teacher William Gasarch

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TAs

- Kunal Mehta
- Seyed Sajjad Nezhadi (goes by middle name)
- Josh Twitty

TA and Teacher office hours and emails are on syllabus.

Location of Office Hours

William Gasarch Brendan Iribe Building 2242.

TAs AV Williams 4166.

ALL CS TAS `http://www.cs.umd.edu/class/resources/cstarooms/fallspring/`

What You Need For This Class

- Discrete math, probability, modular arithmetic, algorithms, misc math.
- Mathematical maturity.
- Ability to write **short** to middle-sized programs. (This is not a course like **Operating systems** where the project is a large part of the course intellectually and for the grade.)

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1. Read notes and slides before class.

2. Ask questions on Piazza and/or bring questions to class.

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   3.1 If cut class and DO watch videos in sync, fine.
   3.2 If cut class and INTEND to watch videos in sync, **not fine**.
   3.3 Recording might not always work.

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- We will keep track of your lateness NOT for grade, but for recommendation letters.

Textbook

Required Text None.
Recommended Text None.

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

How to contact Prof or TAs

- email: Please put “456” in subject line.
- Office hours
- Piazza

Intro To Cryptography

Crypto Is...

- Crypto is amazing.
  - Can do things that initially seem impossible. Example: Alice and Bob can establish a secret key without meeting.
- Crypto is important. Example: Secure financial transactions.
  - It impacts us every day Example: The last time you used a credit card you used crypto.
- Crypto is fun! Example: Making and breaking codes!

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Seriously: Spying depends a lot more on **Math** than on **Fancy Tuxedos**.

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Note: The cutoff of 1975–1976 is approximate since **History of Crypto** is hard and sometimes secret.

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- Illustrates why things are more difficult than they may appear.
- Simple examples of what will later be advanced concepts.

The Course's Main Scenario

Alice, Bob, and Eve

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- Eve does not have enough information to decode it. So even if Eve had unlimited computing power she could not decode. This is **Information-Theoretic Security**.
- Assuming Eve can't factor quickly (or some other computational limitation) then Eve cannot break the code. This is **Computational Security**.

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Alice needs to hide spacing information. What to do?

The Second Step in Any Cipher: Blocks of Five

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Because of blocks-of-5, spaces will not give anything away.

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Note: We assume $a, \ldots, z$ unless otherwise noted.

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