Course Introduction

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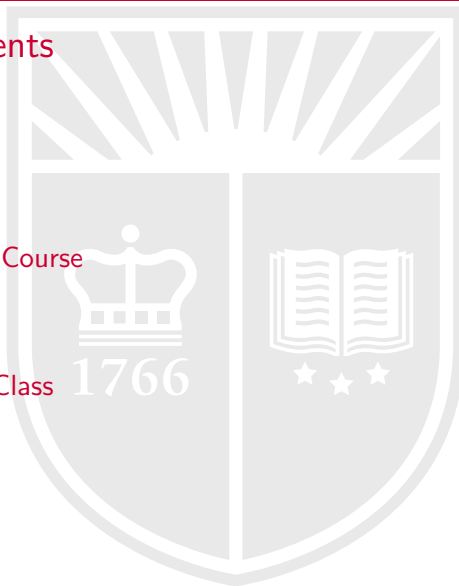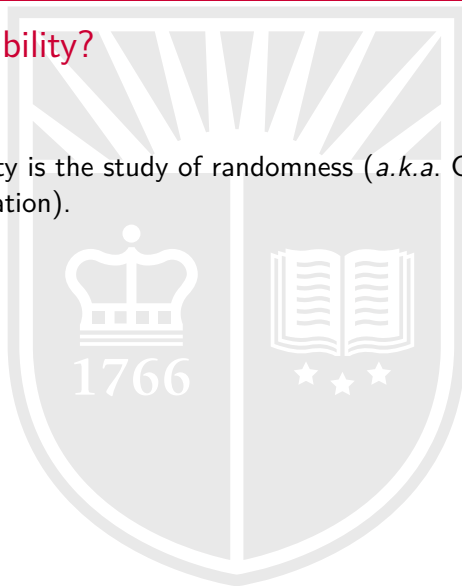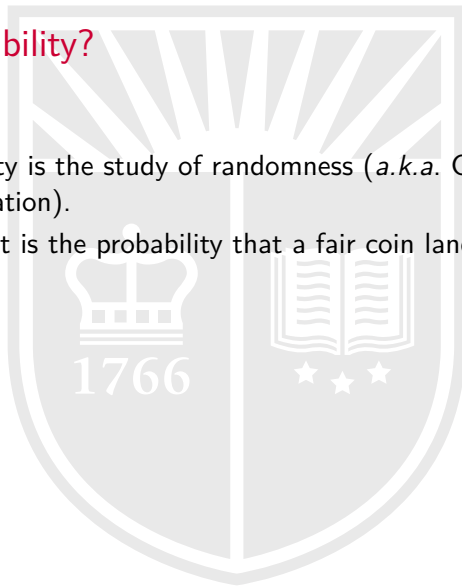# Table of Contents

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- What is the longest run of heads in an 1000-step sequence of a-fair-coin tosses?
- What is the probability that a coin lands heads up **twice** in a row **given** that the 1000-step longest run of heads in a sequence of coin tosses is 10?
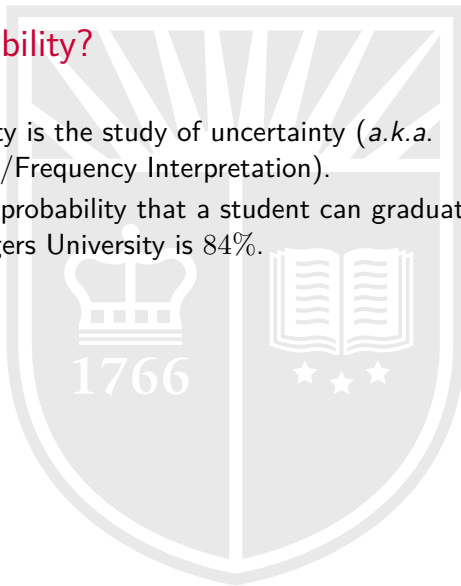
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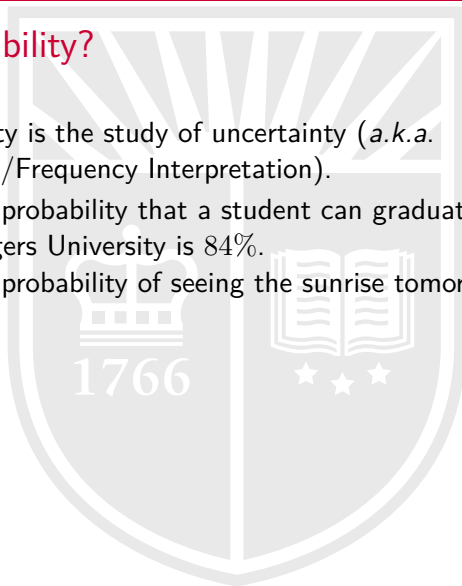The probability of seeing the sunrise tomorrow is 100%.

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Before 2016, what was the probability that you think Brexit would happen?

Probability in Mathematics

Fundamental Concept	Generalized Concept	Purpose
Logic Theory	Category Theory	Reasoning
Number Theory	Algebra (Linear Algebra, Abstract Algebra)	Representation
Discrete (Counting, Combinatorics)	Continuous (Real Analysis and Measure Theory (Probability))	Calculation
Geometric	Topology	Structure

The Goal of This Class—The basic

Introduce the basic concepts and techniques of probability theory.

Illustrate the applications of probability to the analysis of experiments.

The course is designed for students who have had some exposure to probability, but who have not had any formal course in probability.

The Goal of This Class—The realistic

Help students to develop the ability to think probabilistically and prepare them for further study in other engineer courses (*a.k.a.* Get an "A").

Help students to prepare for the job interview questions and certifications and be competitive in the job market (*a.k.a.* Get an "A").

Help students build interests in probability and be ready for further study in graduate school (*a.k.a.* Get an "A").

The Goal of This Class—The Ultimate

The students have knowledge and confidence to make informed decision with understanding of the uncertainty. (*E.g.* Gambling, Insurance, Lottery, Stock, etc.)

The students have potential to mitigate the intuitions of probability in the definition of the "truth" and "reality". (*E.g.* Law, Medicine, Physics, etc.)

Increase the probability that the students can achieve what I couldn't imagine.