

## Lecture 0: Introduction

Yi, Yung (이용)

EE210: Probability and Introductory Random Processes  
KAIST EE

August 27, 2022

- Course logistics
- Why this course?

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Instructor

- Yi, Yung (이용)
- Office: N1, 810
- Homepage: <https://yung-web.github.io/home/>
- E-mail: [yiyung@kaist.edu](mailto:yiyung@kaist.edu)
- Computer Division
- In KAIST EE since 2008

- All lecture videos have already been pre-recorded. Available in [YouTube](#).
- [non-real-time online \( \$\leq 50\%\$ \)](#) + [real-time offline/online \( \$\geq 50\%\$ \)](#)
- [non-real-time online](#): Watch and study anytime and anywhere you like.
- [realtime offline/online](#): Watch lecture videos in the classroom or in the zoom, with asking and answering questions.
- No attendance check!

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- Method 1:  
<https://yung-web.github.io/home/courses/probability.html>
- Method 2: (a) Type **Yung Yi** in the google, (b) visit his [GitHub homepage](#), (c) find the links on [Course](#).

<https://yung-web.github.io/home/courses/probability.html>

[GitHub](#) yung yi

한국어판은 2010년 01월 01일 (0:62분)

도록한 한국어판은 사용해주세요. 환경설정에서 깨끗 인터넷을 사용할 수 있습니다.

<https://scholar.google.com/citations>

**Yung Yi - GitHub Scholar**

Yung Yi, Professor of Electrical Engineering, KAIST. Verified email at kaist.ac.kr · Homepage · Applied machine learning · computer networking · performance ...

<https://oe.kaist.ac.kr/node/>

**YI, YUNG - KAIST ELECTRICAL ENGINEERING**

YI, Yung Yi - Research Group: Computer Research, Machine-learning based computer networking and communication systems, modeling, analysis, and learning ...

<https://yung-web.github.io/>

**Yung Yi GitHub Pages**

2021-11-15 · Since Dr. Yung Yi received his B.S. and the M.S. in the School of Computer Science and Engineering from Seoul National University, ...

제 목이며 다른 제 목으로 표시됩니다. 다음 링크를 선택하세요.

<https://openreview.net/profile?id=Yung.Yi>

**Yung Yi | OpenReview**

Korea Advanced Institute of Science and Technology · Names · Emails · Personal Links · Education & Career History · Advisors, Relations & Conflicts · Expertise.

<https://dl.acm.org/citation.cfm?dih=1>

**Yung Yi - ACM Digital Library**

Mobile networks · Wireless access networks · Machine learning · Network protocols · Sequential decision making · Design and analysis of algorithms · Local area networks

**Education**

- Ph.D. Dept. of Electrical and Computer Engineering, University of Texas at Austin, 2006
- M.S. Dept. of Computer Science, Seoul National University, 1999
- B.S. Dept. of Computer Science and Engineering, Seoul National University, 1997

**LANADA (Laboratory of Network Architecture, Design, and Analysis)**

YI, YUNG is a research group which I currently lead. We are looking for new graduate students.

**Students advised (PhD)**

1. Jimyeong Lee, 2012, Postdoc at U. of Illinois Urbana-Champaign
2. Junning Jiang, 2014, Sony Ericsson, Sweden
3. Joonho Lee, 2014, Hanyang Univ.
4. Haoyu Pei, 2015, National Security Research Inst.
5. Donghyun Kim, 2016, ETRI
6. Soontae Yoo, 2016, ETRI
7. Jhyeyoung Lee, 2016, SRI Telecom
8. Hyungkyung Cho, 2016, Daegu Univ.
9. Jongtaek Oh, 2017, POSTECH
10. Hyungsik Lee, 2017, Samsung

**Position**

- KAIST Chair Professor, KAIST INSTITUTE Dept. of Electrical Engineering, KAIST 2021 - Current
- KAIST Dept. of Electrical Engineering, KAIST 2018.3 - Current
- Associate Professor, Dept. of Electrical Engineering, KAIST, 2008.8-2018
- Assistant Professor, Dept. of Electrical Engineering, KAIST, 2006.8-2008

**Courses**

- Probability and Random Process [Video included, Undergraduate]
- Machine Learning [Video included, Undergraduate]
- Mathematics for Machine Learning [Video included, Undergraduate]
- Computer Network, Undergraduate
- Gameless Network: Machine Learning and Random Video included, Graduate

2020 Spring

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- KLMS:** All notifications and announcements (also sent to you via email)

- KLMS:** Questions about course logistics

- KLMS:** Homework upload

- KLMS:** Score upload and all the grade-related things

- Campuswire:** Questions about course contents (should be in English)

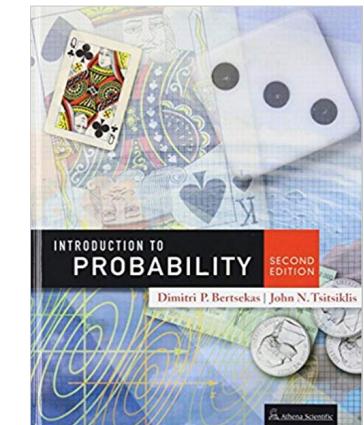
- NOT individual emails to the instructor or the TAs

- Emails to the instructor, Prof. Yung Yi, are allowed for handling private situations.

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## Campuswire Demonstration

- Introduction to Probability**  
(2nd edition)
  - MIT course textbook
  - Dimitri P. Bertsekas and John N. Tsitsiklis
- You can order it from Yes24, Aladin, Kyobo
  - Yes24: <http://www.yes24.com/Product/Goods/3995311>
  - Aladin: <https://www.aladin.co.kr/shop/wproduct.aspx?ItemId=12945615>
  - Kyobo: <http://www.kyobobook.co.kr/product/detailViewEng.laf?ejkGb=ENG&mallGb=ENG&barcode=9781886529380&orderClick=LAG&Kc=>



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- <http://athenasc.com/probbook.html>
- **Solutions for all problems** (so you have all solutions for your homework)
- Links to the old MIT courses
- You can find the urls (2006, 2010, 2013) for the MIT lectures based on the same textbook, where there are many useful resources (recitation problems, homework problems, old exam problems, etc)
- Some of my lecture slides are based on theirs, but my slides are largely modified/reorganized/edited in many places for our purpose.

1. Probabilistic model (0.5 week)
2. Conditioning and Independence (0.5 week)
3. Random Variable, Part I (Discrete Random Variable) (1.5 week)
4. Random Variable, Part II (Continuous Random Variable) (1.5 week)
5. Random Variable, Part III (Advanced Topic on Random Variable) (1.5 week)
6. Limit of Scaled Sum of Random Variables: Central Limit Theorem and Weak Law of Large Numbers (1.5 week)
7. Random Process: Bernoulli and Poisson Processes (2 week)
8. Random Process: Markov Chain (2 week)
9. Introduction to Statistical Inference (2 week)

- 2 Exams (mid-term and final)
- Homeworks
  - All problems are from exercise problems in the textbook.
  - We do NOT check whether you copy your solution from the problem solutions or not.
- 9 Homeworks for each of 9 chapters.

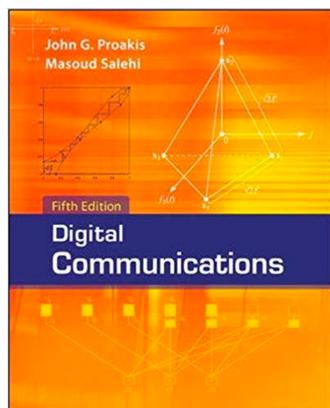
- Read **ALL** the emails.
- Need to buy the textbook?
  - Strongly recommend it. Taking a course is NOT just solving mid-term and final exam problems and getting a good grade.
- OK not to be present in the classroom? Yes.
- OK that my homework solutions is same as those in the solutions book? Yes.
- Can I ask for a personal meeting to ask questions or get other general advices? Sure. Send me an email.

## Questions?

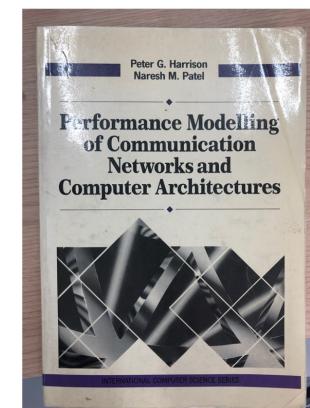
- Many things are "probabilistic"
- Assume that you are a designer of the following engineering systems. Good design?
  - a web server
  - a communication device like mobile phones
  - an AI-based image classifier
- From an engineering point of view,
  - System input
  - Algorithms in systems
  - Analysis of systems

Textbook: Digital Communication

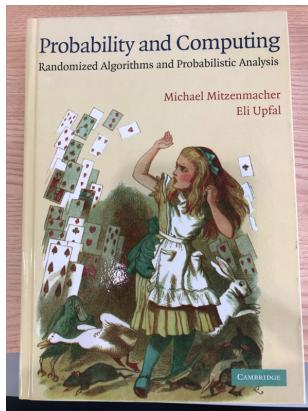
Textbook: Computer Networking



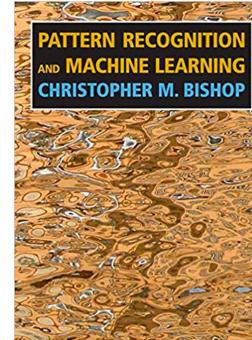
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1.2 Conditional probability	
1.3 Independence	
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2.1 Probability distribution functions	
2.2 Discrete random variables	
2.3 Continuous random variables	
2.4 Joint random variables	
2.5 Conditional distributions	
2.6 Independence and sums	
Exercises	
<b>Chapter 3 Expected Values and Moments</b>	
3.1 Expectation	
3.2 Generating functions and transforms	
3.3 Asymptotic properties	
Exercises	



<i>Preface</i>	<b>1 Events and Probability</b>
	1.1 Application: Verifying Polynomial Identities
	1.2 Axioms of Probability
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	1.4 Application: A Randomized Min-Cut Algorithm
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These days, every area in CS and EE is directly or indirectly related to machine learning!

## How to take this course? A designer's perspective

- Designer's perspective?
- In the year of 2022, suppose that unfortunately there is no theory of mathematically studying the *uncertainty* of some phenomena, events, etc.
- You have to design such a theory called "probability". How are you going to do it? Where are you going to start?
- You just have other basic mathematical theories such as set theory.
- You need to get used to the *English terms* on probability (e.g., sample space = 표본공간, probability density function = 확률밀도함수).
- We will take this exciting journey from the next lecture!

## Questions?

