INTRODUCTION TO PROBABILITY MODELS

Lecture 1

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ABOUT THE INSTRCUTOR

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SYLLABUS

COURSE INFO

- **Textbook:** Introduction to Probability by Mark Dar
  Ellen Gundlach, 1_{st} edition, W.H. Freeman
- **Course website:**
  - http://www.stat.purdue.edu/~cfurtner/stat225
  - **user name:** stat225
  - **password:** fall2018
- **Session website**:
  http://www.stat.purdue.edu/~wang2047/teaching/1

GRADING

Homework	22.0%	125pts
Quizzes	18.4%	105pts
Exam 1	17.5%	100pts
Exam 2	17.5%	100pts
Final Exam	22.0%	125pts
Class Participation	2.6%	15pts
Total	100%	570pts

GRADES

- There will be **NO** curving of individual exam grades
- A student must earn a minimum of 60% on AT LEAST ONE of the 3 exams in order to pass this class.

QUIZ

- 8 are scheduled
- Close book and close notes
- The lowest quiz will be dropped
- Make-up quiz
  - Official documented University business or a documented illness
  - Contact your instructor at least **TWO DAYS** in advance

HOMEWORK

- 5 assignments
- Due at the **begining** of class
- Late homework will **NOT** be accepted
- Must be handwritten or typed using mathematical notation.
- Each homework is worth 25 points, **NO** homeworks are dropped.

EXAMS

- Two evening exams from 8:00 -- 9:30 pm
  - **Exam 1:** Tuesday, 9/25/2018
  - **Exam 2:** Tuesday, 10/30/2018
- A final exam, during the day during final exam week
- Close book and close notes
- Items allowed
  - pencils
  - erasers
  - a scientific calculator (must not have capability to do integration)
  - one-page cheat sheet for mid-terms and two-page for the final
- Show a photo ID to your instructor

CHEAT SHEET

- $8\frac{1}{2} \times 11$
- Handwritten in your own writing
- Both sides
- Handing in your cheat sheet at the end of the exam is required
- Use of printed or photocopied material on a cheat sheet is prohibited and considered cheating in this course

EMERGENCY

- If you hear a fire alarm inside, proceed outside
- If you hear a siren outside, proceed inside
- Fire emergency:
  - immediately suspend class, evacuate the building, and proceed outdoors
  - do not use the elevator
  - meet outside by fountain near John Purdue's grave
- Tornado warning/servere weather event
  - suspend class and shelter in interior hallway on 1_{st} floor
- Shelter in place
  - suspend class and shelter in the classroom
  - shutting the door and turning off the lights

- A gambler's dispute in 1654 led to the creation of a mathematical theory of probability by two famous French mathematicians, Blaise Pascal and Pierre de Fermat

- The game consisted in throwing a pair of dice 24 times, the problem was to decide whether or not to bet even money on the occurrence of at least one "double six" during the 24 throws

BASIC TERMINOLOGY

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This course is a course on Probability. The following terminology will assist us in the study of Probability.

- **Element:** a single item(outcome), typically denoted by ω
- **Set:** a collection of elements
  - For example, $A = \{x, y, z\}$
  - $x \in A$, x is a memeber of set A
  - $j \notin B$, j is not a smember of set B
- **Population:** the collection of all individuals or items under consideration
- **Random Experiment:** an action whose outcome cannot be predicted with certianty beforehand
- **Sample Space:** the set of all possible outcomes for a random experiment, typically denoted by Ω, the textbook uses S
- **Event** a result that may or may not occur, a subset of Ω
- **Subset:** a set in which every element is contained in another set
  - Notation: $A \subset B$, A is a subset of B
- **Complement:** a set that contains all of the elements in Ω that aren't in the original set
  - Notation: A^c is the complement of A
- **Empty Set:** the set with no element in it, denoted by ∅ or { }

EXAMPLE 1

We check whether the Standard and Poor's 500 Index at the end of the day shows an increase, a decrease or remains the same as the previous days ending index.

1. For one day, what is the sample space for this scenario?
2. What is the sample space for two days?
3. Define event A: the S & P decreases at least one day. List the outcomes in A.
4. What are the outcomes in the complement of A?
5. What do you notice if we combine A and its complement?