

EELE 3340

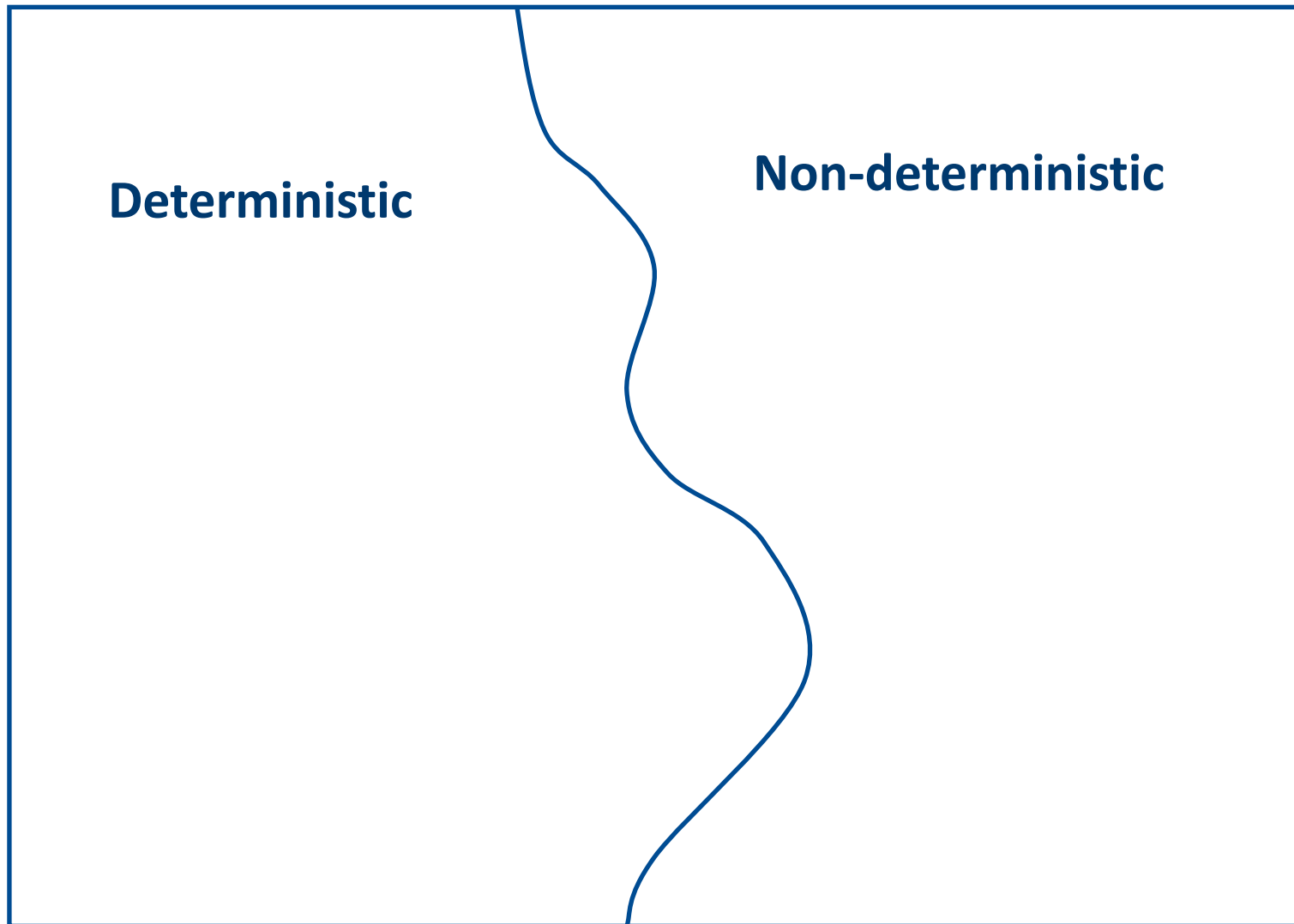
Probability Theory



Intoduction

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Phenomena



Deterministic Phenomena

- There exists a mathematical model that allows “*perfect*” prediction the phenomena’s outcome.
- Many examples exist in Physics, Chemistry (the exact sciences).

Non-deterministic Phenomena

- No mathematical model exists that allows “perfect” prediction the phenomena’s outcome.
- may be divided into two groups:

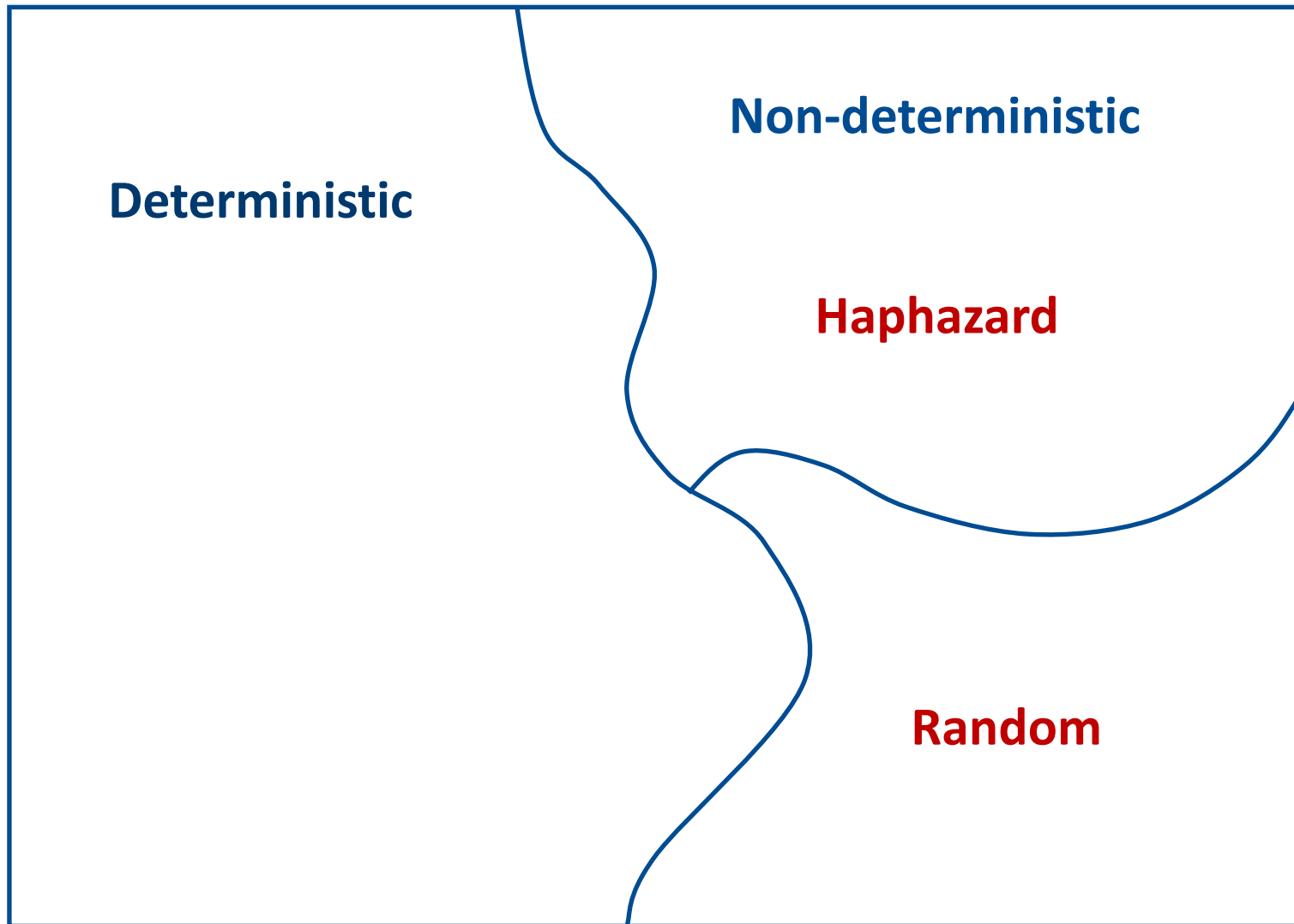
1) Random phenomena

It is something that we do not control, in the sense that it may lead to different outcomes or measurements of the phenomenon in what we believe are “identical” conditions. The outcomes are uncertain but there is nonetheless a regular distribution of outcomes in a large number of repetitions.

2) Haphazard phenomena

unpredictable outcomes, no statistical regularity in the outcomes after large number of repetitions.

Phenomena



Probability Theory

A tool to

- Describe
- Analyze

Randomness in nature, and to

- Design
- Control

Engineering systems

Probability Applications

- The World is full of uncertainty!
- Knowing probability theory is important !
- Weather report:
 - Likelihood to rain today
 - Power of Katrina
- **Statistical Inferential**
 - Risk Management and Investment
 - Value of stocks, options, corporate debt;
 - Insurance, credit assessment, loan default
- **Industrial application**
 - Estimation of the life of a bulb, the shipping date, the daily production
- **Communication and computer systems**

Probability Applications

