COURSE DETAILS
Course Code: F71SP
Full Course Title: Applied Stochastic Processes
SCQF Level: 11
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: No  Postgraduate Taught: Yes  Postgraduate Research: No
Additional Information:

COURSE AIMS
To introduce stochastic processes used in stochastic and statistical modelling, and to provide an introduction to modern mathematical tools for studying such processes

LEARNING OUTCOMES – SUBJECT MASTERY
After studying this module, students should be able to:

- Understand the definition and basic properties of branching processes
- Calculate various statistics of interest for branching processes
- Understand the concept of a branching random walk
- Define various models of random graphs
- Apply certain approximation techniques for sums of random variables
- Calculate various statistics of interest for a range of random graph models
- Understand the concept of percolation and data/epidemic spread on a graph

LEARNING OUTCOMES – PERSONAL ABILITIES
At the end of this module, students should be able to

- demonstrate self-initiative and the capacity for independent thought
- manage time and prioritize workloads
- present technical results clearly and coherently

SYLLABUS
- Branching process
- Definition
- Survival vs extinction

- Moments for number of individuals in a generation

- Limiting results

- Branching random walks
  - Approximations for sums of random variables
  - Random Graph models

- Introduction and basic definitions of graphs and associated theory

- Definition of random graph models

- Basic properties of random graph models including Erdos-Reyni random graph, preferential attachment, configuration model
  - Percolation and epidemic and data spread over a graph

### COURSE RELATIONSHIPS

N/A

### LOCATION AND ASSESSMENT METHODS

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