

- Faculté des sciences
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Introduction to Stochastic Processes (3ST2022)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
Master en statistique	Cours: 2 ph	Voir ci-dessous	3

ph=période hebdomadaire, pg=période globale, j=jour, dj=demi-jour, h=heure, min=minute

Période d'enseignement:

- Semestre Automne

Equipe enseignante

Professeur : Bardia Panahbehagh
Institut de statistique; Av. de Bellevaux 51, CH-2000 NEUCHATEL, Switzerland

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In this course, students will learn about the definitions and theorems of discrete time stochastic processes. Any random variable that can be tracked over time or location can be modelled on stochastic processes. During this course we give the student some probabilistic intuition and insight to model simple real problems in the form of stochastic processes. More precisely, they should be able to analyse the process states and predict the future of the process in the near and far times.

The course contains the following topics:

1. A Quick Review on Probability and Random Variable;
2. Stochastic Processes;
3. Discrete Time Markov Chains;
4. Examples of Markov Chains;
5. Distribution of X_t ;
6. Multi-step Transition Probabilities;
7. Hitting Time;
8. Communicate of Two States;
9. Transient and Recurrent States;
10. Expectation Number of Visits;
11. Absorption Probabilities;
12. Gambler's Ruin;
13. Branching Processes: The Theory of Reproduction;
14. Limiting Distributions and Stationary

Forme de l'évaluation

CA graded: Continuous Assessment

Nine exercises are provided for you as homework. The share of each exercise in the final mark is specified and the order of delivery of the exercises is planned based on the topics of the sessions. You will have one week to deliver each exercise (or at most two weeks if you have an acceptable reason).

Send the exercises as a PDF file to bardia.panahbehagh@unine.ch

Set the subject of the emails and also the name of your files as the exercise numbers and your name.

If you want the full mark of the exercises,

- 1-Send me the solutions on time and correctly
- 2-Be ready to answer my questions about your solutions during a face to face meeting after finishing the course completely.

Documentation

[1] Fewster, R. (2013), Course Notes, Stochastic Processes, Department of Statistics University of Auckland, available at <https://www.stat.auckland.ac.nz/~fewster/325/notes/325book.pdf>.

[2] Norris, J.R. (1997), Markov Chains, Cambridge University Press.

[3] Pasha, E. (2001), Stochastic Processes, PNU Press.

[4] Pishro-Nik, H. (2014), "Introduction to probability, statistics, and random processes", available at <https://www.probabilitycourse.com>, Kappa Research LLC.

[5] Ross, S. (1996), Stochastic Processes, Wiley.

The lecture note pdf:

<https://moodle.unine.ch/pluginfile.php/351245/course/section/94937/Stochastic%20Processes.pdf?time=1632077076398>