STOCHASTIC MODELING AND SIMULATION

- **Course code**

  8167
- **Type of course (compulsory, optional)**

  Elective (compulsory for the stream "Operations Research and Management Science")
- **Level of course** (e.g. first, second or third cycle; sub-level if applicable)

  N/A
- **Year of study**

  2013-2014
- **Semester**

  7th semester
- **Number of credits allocated**

  6 ECTS Credits
- **Name of lecturer**

  Ioannis Mourtos, Assistant Professor, Georgios Lekakos, Assistant Professor
- **Learning outcomes**

  This course examines on one hand the fundamental types of stochastic models employed within Management Science and, on the other hand, the use of simulation techniques in cases where stochastic methods are of limited applicability. In addition, it discusses the application of all the above in real settings of decision support, using simulation software packages.
  Stochastic modeling includes mostly Markov processes and Markov chains, while also examining topics in Queuing Theory, Replacement Theory and basic principles of Stochastic Dynamic Programming
  Simulation refers mostly to discrete event simulation, while presenting also techniques for model building and validation and analysis of simulation output. Emphasis is given to the construction of simulation models through appropriate software packages, hence part of the course is implemented via lab exercises and tutorials and through a compulsory project which includes all steps of applying simulation on a real-life problem.

- **Mode of delivery (face-to-face, distance learning)**

  Face-to face teaching in the form of lectures and lab tutorials, case-study discussion
- **Prerequisites and co-requisites**

  N.A.
- **Recommended optional programme components**

  N.A.
- **Course contents**

  The course material includes the following topics:
  - Markov processes and chains
  - Queuing Theory, Replacement Theory, Inventory Theory
  - Stochastic dynamic programming
  - Simulation as an experimental methods, applications in Management Science, basic simulation techniques
  - Discrete even simulation, entities and activities, events and queues, resources activity cycle diagrams

- Simulation languages and packages, the SIMUL8 software
- Transient and steady state, input and output analysis, random-number generators, experimentation principles
- Simulation modeling of real-life applications, case-study discussion

Το προτεινόμενα βιβλία προς μελέτη είναι τα εξής.

- Π. Μηλιώτης: Στοχαστικά Υποδείγματα Επιχειρησιακής Έρευνας, Πανεπιστημιακές Σημειώσεις
- Γ. Γιαγλής, Α. Καραγιαννάκη: Ποσοτική και ποιοτική μοντελοποίηση επιχειρηματικών διαδικασιών, Εκδόσεις ΟΠΑ.

- **Recommended or required reading**

  📖 P. Miliotis, Stochastic Models in Operations Research, Lecture Notes (in Greek).

  📖 G. Giaglis, A. Karagiannaki: Quantitative and qualitative modelling of business processes, AUEB press (in Greek)

  Further textbooks that are recommended and available at the library:

  📖 Banks, J., Carson, J.S. II, Nelson, B.L., Nicol, D.M. (2001). Discrete-event System Simulation. (3rd ed.) Prentice Hall International Series in Industrial and Systems Engineering

  📖 Kelton, W.D., Sadowski, R.P., Sadowski, D.A. (2002). Simulation with Arena. (2nd ed.). McGraw-

  📖 Hill series in Industrial Engineering and Management Science.

  📖 Law, A.M., Kelton, W.D. (2000). Simulation Modeling and Analysis. (3rd ed.). McGraw-Hill series in Industrial Engineering and Management Science.

  Additional notes, exercise and teaching material are available on the Department's educational portal (Eduportal)

- **Planned learning activities and teaching methods**

  N.A.

- **Assessment methods assessment methods and criteria**

  Assessment is determined by the final written examination and a compulsory assignment, which asks for the simulation modelling and analysis of a real problem..

- **Language of instruction**

  Greek

- **Work placement(s)**

  N.A.