**COURSE OUTLINE**

**GENERAL**

| | |
|---:|:---|
| **SCHOOL** | School of Science |
| **ACADEMIC UNIT** | Department of Mathematics |
| **LEVEL OF STUDIES** | undergraduate |
| **COURSE CODE** | MAE634 |

| | | | |
|---:|:---|---:|:---|
| **COURSE CODE** | MAE634 | **SEMESTER** | 6° |
| **COURSE TITLE** | Queueing theory | | |

| **INDEPENDENT TEACHING ACTIVITIES** *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits* | **WEEKLY TEACHING HOURS** | **CREDITS** |
|:---|:---:|:---:|
| lectures | 3 | 6 |
| | | |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |
| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | special background | |
| **PREREQUISITE COURSES:** | No | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | yes | |
| **COURSE WEBSITE (URL)** | | |

**LEARNING OUTCOMES**

> **Learning outcomes**
> *The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*
>
> *Consult Appendix A*
> - *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
>
> - *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
>
> - *Guidelines for writing Learning Outcomes*

The course learning outcomes are: the study and development models that describe and analyse the behaviour and performance of queueing systems and their applications for optimal decision making.
Upon successful completion of the course the student will be able to:

1. recognize and implement M/M/1 queue model and its variants
2. apply the Little's result
3. recognize and implements M/G/1 queue model
4. apply Markov processes to model queueing systems
5. apply queueing models for decision making

General Competences
*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

| | |
|---|---|
| *Search for, analysis and synthesis of data and information, with the use of the necessary technology* | *Project planning and management* |
| | *Respect for difference and multiculturalism* |
| | *Respect for the natural environment* |
| *Adapting to new situations* | *Showing social, professional and ethical responsibility and sensitivity to gender issues* |
| *Decision-making* | |
| *Working independently* | *Criticism and self-criticism* |
| *Team work* | *Production of free, creative and inductive thinking* |
| *Working in an international environment* | |
| *Working in an interdisciplinary environment* | *Others* |
| *Production of new research ideas* | |

Working independently
Decision-making
Adapting to new situations
Production of free, creative and inductive thinking
Synthesis of data and information, with the use of the necessary technology

**SYLLABUS**

Introduction. Birth death process. Transforms. Markovian Queueing Systems (M/M/1/∞, M/M/m/k, M/M/m/m, M/M/∞/∞). Queue with group arrival, Queue with group services, M/G/1/∞. Applications for optimal decision making.

**TEACHING and LEARNING METHODS - EVALUATION**

| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face-to-face |
|---|---|
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Software for the calculation of queueing systems performance measures, Email, class web |

| **TEACHING METHODS** *The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* | *Activity* | *Semester workload* |
|---|---|---|
| | Lectures | 39 |
| | Independent study | 78 |
| | Fieldwork (3-4 set of homework) | 33 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS | Course total | **150** |
|---|---|---|

| **STUDENT PERFORMANCE EVALUATION** *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | LANGUAGE OF EVALUATION: Greek METHODS OF EVALUATION: Final exam (100%) |
|---|---|

**ATTACHED BIBLIOGRAPHY**

- *Suggested bibliography:*
Φακίνος, Δ. Στοχαστικά Μοντέλα στην Επιχειρησιακή Έρευνα, Σ. Αθανασόπουλος-Σ. Παπαδάμης & ΣΙΑ, Αθήνα, 2003.
Hillier F.S. and Lieberman, G.J. Introduction to Operations Research, 7/E. McGraw-Hill, New York, 2000.
Taha, H.A. Operations Research: An Introduction, 9/E. Prentice Hall, Englewood Cliffs, NJ, 2011.
Ross, S.M. Introduction to Probability Models, 9/E. Academic Press, Amsterdam 2007.
- *Related academic journals:*
Queueing Systems, Theory and Applications