**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | Applied Economics and Social Sciences | | | | |
| **DEPARTMENT** | Regional and Economic Development | | | | |
| **COURSE LEVEL** | Undergraduate | | | | |
| **COURSE CODE** | 6844 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Operational Research | | | | |
| **INDEPENDENT TEACHING ACTIVITIES** *where credit is awarded for discrete parts of the course e.g. lectures, laboratory exercises, etc. If credit is awarded for the whole course, indicate the weekly teaching hours and the total number of credits* | | | **WEEKLY**  **TEACHING HOURS** | | **TEACHING/CREDIT UNITS** |
| Lectures | | | 4 | | 5 |
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|  | | |  | |  |
| *Add rows if necessary. The teaching organisation and the teaching methods used are described in detail in 4.* | | |  | |  |
| **TYPE OF COURSE**  Background, General Knowledge, Scientific Area, Skills Development | Scientific area course | | | | |
| **PREREQUISITES:** |  | | | | |
| **LANGUAGE OF TEACHING AND EXAMINATION:** | Hellenic (Greek) | | | | |
| **THE COURSE IS OFFERED TO ERASMUS STUDENTS** |  | | | | |
| **ELECTRONIC COURSE PAGE (URL)** |  | | | | |

1. **LEARNING OUTCOMES**

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| **Learning Outcomes** | |
| *The learning outcomes of the course describe the specific knowledge, skills and competences of an appropriate level that students will acquire after successful completion of the course.*  *Consult Annex A*   * *Description of the Level of Learning Outcomes for each cycle of study according to the Qualifications Framework of the European Higher Education Area* * *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B* * *Comprehensive Guide to the Writing of Learning Outcomes* | |
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| **General skills** | |
| *Taking into account the general competences that the graduate should have acquired (as listed in the Diploma Supplement and listed below), which one(s) does the course aim at?* | |
| *Search, analysis and synthesis of data and information, including the use of the necessary technologies*  *Adaptation to new situations*  *Decision-making*  *Autonomous work*  *Group work*  *Working in an international environment*  *Working in an interdisciplinary environment* | *Generating new research ideas Project planning and management*  *Respect for diversity and multiculturalism*  *Respect for the natural environment*  *Demonstrating social, professional and ethical responsibility and gender sensitivity*  *Exercise of criticism and self-criticism*  *Promotion of free, creative and deductive thinking.* |
| Search, analysis and synthesis of data and information, using the necessary technologies  Decision-making  Autonomous work  Generating new research ideas  Respect for the natural environment  Promotion of free, creative and deductive thinking | |

1. **COURSE CONTENT**

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| Introduction to Operational Research, Basic concepts of linear programming, problem modeling, interpretation and mathematical formulation, Problem solving, Graphical problem solving, linear programming methods, The SIMPLEX method, Formal form, The M method and the two phases method, Duality theory, properties of dual problems, Sensitivity analysis, The transportation problem, Integer and mixed programming problems. Applications in Economics and Regional Science. |

1. **TEACHING and LEARNING METHODS - EVALUATION**

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| **METHOD OF DELIVERY**  Face-to-face, Distance learning, etc. | Lectures and meetings with students |
| **USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  Use of ICT in Teaching, Laboratory Training, Communication with students | Computer and interactive whiteboard will be used in the teaching.  Communication with students will be on a personal level, also using e-mail and telecommunication (e.g. Skype). |
| **ORGANISATION OF TEACHING**  The way and methods of teaching are described in detail.  Lectures, Seminars, Laboratory Exercise, Field Exercise, Study & Analysis of Literature, Tutorials, Practical (Placement), Clinical Exercise, Artistic Workshop, Interactive teaching, Educational visits, Study visits, Project work, Writing of work / assignments, Artistic creation, etc.  The student's study hours for each learning activity as well as the hours of unguided study are indicated so that the total workload at semester level corresponds to the ECTS standards. | |  |  | | --- | --- | | ***Activity*** | ***Semester Workload*** | | Course deliveries | 52 hours | | Study of taught material | 52 hours | | Study and research of databases and additional work | 21 hours | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Total Course | 125 hours | |
| **STUDENT ASSESSMENT**  Description of the evaluation process  Language of Assessment, Assessment Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Test Development Questions, Problem Solving, Written Work, Report, Oral Examination, Oral Examination, Public Presentation, Laboratory Work, Clinical Examination of a Patient, Artistic Interpretation, Other  Explicitly identified assessment criteria are stated and if and where they are accessible to students. | Written exams at the end of the course and progress exams during the semester. |

1. **RECOMMENDED-LITERATURE**

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| The basic literature that will be used is  Greek Litarature   1. Taylor Bernard Εισαγωγή στη Διοικητική Επιστήμη, Εκδόσεις BROKEN HILL PUBLISHERS LTD, SBN: 9789963274451 2. Π. Υψηλάντης (2015). Επιχειρησιακή Έρευνα, Συγγραφείς:, "Εκδόσεις ΠΡΟΠΟΜΠΟΣ" ΚΙΜΕΡΗΣ Κ. ΘΩΜΑΣ, ISBN 9786185036201 3. Hillier F.S., Lieberman G.J., Διαμαντίδης Α. (Επιστ. Επιμέλεια) (2022) Εισαγωγή στην Επιχειρησιακή Έρευνα, 11η Έκδοση, Εκδόσεις Α. Τζιόλα   *International Literature*   1. F. S. Hillier, G. J. Lieberman, (2005) “Introduction to Operations Research”, McGraw-Hill. 2. Maros, I. (2002). Computational techniques of the simplex method (Vol. 61). Springer Science & Business Media. 3. Paris, Q. (2016). An economic interpretation of linear programming. Springer. 4. Kaiser, H. M., & Messer, K. D. (2011). Mathematical programming for agricultural, environmental and resource economics. John Wiley and Sons, Inc. 5. Padberg, M. (2013). Linear optimization and extensions (Vol. 12). Springer Science & Business Media.     *Suggested papers*   1. Protasov, V. Y. (2016). Spectral simplex method. Mathematical Programming, 156(1-2), 485-511. 2. Dütting, P., Henzinger, M., & Weber, I. (2013). Sponsored search, market equilibria, and the Hungarian Method. Information Processing Letters, 113(3), 67-73. 3. Maity, G., & Kumar Roy, S. (2016). Solving a multi-objective transportation problem with nonlinear cost and multi-choice demand. International Journal of Management Science and Engineering Management, 11(1), 62-70. 4. Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. Science, 323(5916), 892-895. 5. Stahlbock, R., & Voß, S. (2008). Operations research at container terminals: a literature update. OR spectrum, 30(1), 1-52. 6. Shy, O. (2011). A short survey of network economics. Review of Industrial Organization, 38(2), 119-149. 7. Higgins, A. J., Miller, C. J., Archer, A. A., Ton, T., Fletcher, C. S., & McAllister, R. R. J. (2010). Challenges of operations research practice in agricultural value chains. Journal of the Operational Research Society, 61(6), 964-973. 8. Facchinei, F., & Kanzow, C. (2010). Generalized Nash equilibrium problems. Annals of Operations Research, 175(1), 177-211.   *Related scientific journals*  Operational Research (Springer)  European Journal of Operations Research (Elsevier)  Journal of Operational Research Society (Taylor & Francis)  Annals of Operations Research (Springer)  Operations Management Research (Springer)  4OR (Springer)  Operations Research Perspectives (Elsevier)  International Journal of Mathematics in Operational Research (Inderscience) |