Operational research and scheduling of athletic events

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE		**TRIMESTER**	**3 OR 6**
COURSE TITLE	Operational research and scheduling of athletic events		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
	1,5	2,5
	15	2,5

COURSE TYPE	Specialization Elective
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	ENGLISH
COURSE DELIVERY METHOD	Distance
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://cloud.aueb.gr/index.php/s/25FEdHN4sW6nZ2a

(2) LEARNING OUTCOMES

Learning outcomes
• Understand fundamental principles of Operations Research and their application in sports decision-making. • Use mathematical optimization models to plan and organize sporting events. • Analyze objectives and constraints in match scheduling, including facilities, team travel, and spectator attendance. • Model sports scheduling problems using linear optimization techniques. • Explore nonlinear models and solution algorithms, including genetic algorithms and simulated annealing. • Evaluate and analyze match schedules using performance metrics such as fairness, balance, and commercial potential. • Gain experience with software tools for sports schedule development and analysis. • Apply scheduling methods to various sports and competition formats.
General Competences
• Collect, analyze, and synthesize data using relevant technologies. • Collaborate effectively in interdisciplinary teams. • Make informed decisions based on data and analysis. • Adapt effectively to new situations and challenges.

(3) SYLLABUS

This course aims to introduce students to the applications of Operations Research in sports scheduling. Students will acquire knowledge in modeling and problem-solving techniques related to creating fair, efficient, and engaging match schedules across various sports.
Introduction to Operations Research: Fundamental concepts and methodologies, and mathematical decision-making models.
Sports Event Scheduling: Objectives and constraints, factors affecting schedule creation (e.g., facility availability, team travel, spectator attendance).
Problem Modeling: Linear optimization models for sports scheduling.
Nonlinear Models and Solution Algorithms: Techniques such as genetic algorithms and simulated annealing.
Schedule Evaluation and Analysis: Performance metrics for sports scheduling, including fairness, balance, and commercial viability.
Software Applications: Tools for developing and analyzing schedules.
Applications Across Different Sports: Case studies drawn from real-world sports practice.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance
METHOD AND FREQUENCY OF COMMUNICATING WITH THE STUDENTS	Remotely via email and through weekly office hours (and whenever necessary) via teleconferencing or in-person office visits.
ENSURING COMMUNICATION AMONG STUDENTS	Teleconference, Chat via eclass and/ or TEAMS, and QA sessions
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	MS Teams, e-class, MS Outlook, R, Python, WayGround or Kahoot educational games and quizzes
REQUIRED EQUIPMENT AND TECHNOLOGY KNOWLEDGE	Camera, mic, PC, MS Office, and TEAMS
COURSE POLICY ON PLAGIARISM AND PLAGIARISM DETECTION TOOLS	Turnitin
COURSE POLICY ON USE OF AI TOOLS	The use of Artificial Intelligence is permitted with explicit reference to the bibliography (2) for the verbal correction of assignments and as long as students have understood the basic principles and methods of the course.
TEACHING METHODS	

Activity	***Semester workload***
Lectures	15
Assignment writing	20
Lab Exercise	10
Self-Study hours	20
Course total	***65***

STUDENT PERFORMANCE EVALUATION	Evaluation language is English. Evaluation methods include lab exercises, written assignments, and/or written examinations. Oral examinations of the assignments may be conducted if clarifications are needed or if there are suspicions of plagiarism or unauthorized use of Artificial Intelligence tools. Assessment criteria are provided on the course eClass platform and in the course materials.

(5) RECOMMENDED BIBLIOGRAPHY

- Lawrence, J.A. and Pasternack, B.A. (2002). Applied Management Science: Modeling, Spreadsheet Analysis, and Communication for Decision Making. Wiley & Sons
- Ribeiro C.C., Urrutia S., de Werra D. (2023). Combinatorial Models for Scheduling Sports Tournaments. EURO Advanced Tutorials on Operational Research Series. Springer Nature Switzerland; DOI: https://doi.org/10.1007/978-3-031-37283-4
- Serbin B.J. (2019). A Schedule Quick: Quick & Easy Scheduling for Recreational Sports Leagues