

Sports modelling

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE		TRIMESTER	2
COURSE TITLE	Sports modelling		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
		3	2,5
		30	5
COURSE TYPE	Specialization Course in Sports Data Science and Elective Specialization in Applied Sports Analytics		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	ENGLISH		
COURSE DELIVERY METHOD	Distance		
IS THE COURSE OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)	https://cloud.aueb.gr/index.php/s/dkR2pcT2P6fcJQx		

(2) LEARNING OUTCOMES

Learning outcomes
• Apply statistical modeling techniques to analyze sports performance. • Use simple and multiple linear regression with least squares for model fitting. • Select relevant variables and appropriate models for sports datasets. • Identify and address violations of regression assumptions. • Perform prediction and inference on game outcomes and performance metrics. • Extend regression models to specialized sports data. • Explore logistic regression for sports without draws. • Apply multinomial regression for categorical outcomes in sports with draws, such as football.
General Competences
• Analysis and synthesis of data and information, including the use of appropriate data technologies. • Decision-making skills. • Ability to work in an interdisciplinary environment.

(3) SYLLABUS

The course focuses on the application of statistical modeling in the field of sports. It begins with an analysis of simple and multiple linear regression, emphasizing model fitting using the least squares method. Topics include variable selection, model selection, and the diagnosis and handling of deviations from model assumptions. Applications are presented using performance analysis data, as well as prediction and inference techniques for game outcomes in sports such as basketball. The course then explores the extension of regression models to specialized datasets suitable for sports modeling. Logistic regression is introduced for binary outcomes, with applications in sports that do not allow draws. Finally, multinomial regression is covered for categorical outcomes, with an emphasis on sports that permit draws as final results, such as football.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	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	30
	Assignment writing	40
	Lab Exercise	20
	Self-Study hours	40
	Course total	130
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.
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(5) RECOMMENDED BIBLIOGRAPHY

• Wasserman, L. (2013). All of statistics: a concise course in statistical inference. Springer Science & Business Media. • Krzanowski, W. J. (1998). An introduction to statistical modelling. • Morgan, B. J. (2008). Applied stochastic modelling. CRC press.
