1. BASIC INFORMATION

Course	New Technologies Applied to Elite Performance in Sport
Degree program	Bachelor's Degree in Exercise and Sport Sciences
School	Medicine, health, and sports
Year	4
ECTS	6 ECTS
Credit type	Optional
Language(s)	Spanish. English.
Delivery mode	On campus
Semester	S7 and S8
Academic year	2025-2026
Coordinating professor	Álvaro Bustamante Sánchez

2. PRESENTATION

This subject area is designed for students to build the skills needed to work and develop professionally as elite performance coaches. The aim is to understand the latest technology available in the field of sports and to know how to use, identify and determine the most useful tools for professional coaches.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies:

- CB3: To gather and interpret relevant data (usually within their area of study) to form opinions which include reflecting on relevant social, scientific or ethical matters.
- CB4: To convey information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5: To develop the necessary learning skills to undertake further study with a high degree of autonomy.

Cross-curricular competencies:

- CT5: Ability to put knowledge into practice, using the skills acquired through the study of mock situations based faithfully on real life issues in the relevant profession.
- CT8: Information management: Ability to seek, choose, analyse and integrate information from diverse sources.
- CT14: Innovation/Creativity: Ability to propose and invent new, original solutions that contribute towards improving problem situations, including ideas from other contexts.
- CT18: Use of information and communication technology (ICT): Ability to effectively use information and communication technology as a tool for finding, processing and storing information, and for developing communication skills.

Specific competencies:

- CE3: Ability to plan, programme, apply, monitor and assess training and competition processes at different levels and in different age groups.
- CE4: Ability to analyse and apply physiological, biomechanical, psychological and social principles in different areas of physical activity, sport and recreation.
- CE8: Ability to design, plan, organise, implement and evaluate regular and/or one-off sport and recreation programmes, considering all factors that might affect these programmes in different professional, social and economic contexts.

Learning outcomes:

- RA1: To understand key concepts related to specific software and hardware.
- RA2: To understand and master key concepts for sports analysis.
- RA3: To act professionally when using equipment and following safety protocols during practical activities that involve different tools and equipment.
- RA4: To produce essays in order to study different sports.
- RA5: To produce in-depth analysis and summaries based on searches of key literature about new technologies.

The following table shows the relationship between the competencies developed during the course and the learning outcomes pursued:

Competencies	Learning outcomes
CB3, CB5, CT5, CT18, CE3, CE4	RA1: To understand key concepts related to specific software and hardware.
CB3, CB5, CT5, CT18, CE3, CE4, CE8	RA2: To understand and master key concepts for sports analysis.
CB3, CB5, CT5, CT18	RA3: To act professionally when using equipment and following safety protocols during practical activities that involve different tools and equipment.
CB3, CB5, CT8, CT14, CT18	RA4: To produce essays in order to study different sports.
CB3, CB5, CT8, CT14, CT18	RA5: To produce in-depth analysis and summaries based on searches of key literature about new technologies.

4. CONTENT

This section lists the content of each of the topics in the learning units.

- Observation and analysis of training and competition.
- Tools and instruments for observing, analysing and monitoring performance.
- Software for tactical and strategic analysis and for statistical monitoring of performance.
- Software for monitoring and planning training.
- GPS technologies
- Use of smartphones and tablets
- Control and assessment of training and competition.
- Control and assessment of effort: internal and external load.
- Control and assessment of behaviours.
- Control and assessment of performance: model for analysing performance in competitions.
- Future prospects.

The content will be divided into the following learning units.

- Topic 1: INTRODUCTION
- Topic 2: HEART RATE MONITORS
- Topic 3: MEASURING STRENGTH
- Topic 4: MEASURING JUMPING ABILITIES
- Topic 5: GPS
- Topic 6: TIMING SYSTEMS
- Topic 7: TRAINING AND PLANNING SOFTWARE
- Topic 8: APPS
- Topic 9: WEARABLES
- Topic 10: LATEST DEVELOPMENTS

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Lectures.
- Case studies.
- Collaborative learning.
- Problem-based learning (ABP by its acronym in Spanish).
- Simulation environments.

IMPORTANT NOTE: For the correct development of the module, students must purchase a heart rate sensor compatible with the mobile apps that will be used in the subject (for example Polar H10).

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Lectures	18
Asynchronous lectures	8
Debates and discussions	10
Oral presentations	5
Essays, text commentaries and critical text analysis	36
Workshop and laboratory activities	25
Tutorials	8
Independent working	40
TOTAL	150 h

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Reflective journal	20% (15–25%)
Participation in classroom activities	20% (15–25%)
Oral presentations	20% (15–20%)
Laboratory work	20% (20–25%)
Assessment of reports and written work	20% (15–25%)

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you must complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period through the continuous assessment modality, you must obtain a grade of at least 5 out of 10 in all the assessments, and a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of 5.0 in the final exam for it to count towards the final grade along with all the grades corresponding to the other activities, in the case of not choosing the continuous assessment modality.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a grade of at least 5 out of 10 in all the assessments, and in the final grade (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Deadline
To produce a report about the use of systems for measuring heat rate and heart rate variability.	September
To produce a report on the use of technology to assess training.	October
To produce a report on the use of technology to assess performance.	November
To produce a report on the use of technology to assess performance in order to manage training loads.	December

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAPHY

The main reference work for this subject is:

- French, D., & Ronda, L. T. (Eds.). (2021). NSCA's Essentials of Sport Science. Human Kinetics.

The recommended Bibliography is:

- Allen H, Coggan A (2006) Training and racing with a power meter. Boulder, Colorado. Velopress.
- Aughey RJ (2011a) Applications of GPS technologies to field sports. Int J Sports Physiol Perform 6(3): 295-310.
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- Duffield R, Reid M, Baker J, Spratford W (2010) Accuracy and reliability of GPS devices for measurement of movement patterns in confined spaces for court-based sports. J Sci Med Sport 13(5): 523-525.
- González Badillo JJ (1992) Metodología del entrenamiento para el desarrollo de la fuerza. Madrid. Comité Olímpico Español (COES)
- Lehman SL (1991) Measurement of lactate production by tracer techniques. Med Sci Sport Exerc 23: 935-938.
- Léger L, Boucher R (1980) An indirect continuous running multistage field test: the Université de Montréal track test. Can J Appl Sport Sci 5(2): 77-84.
- Lucía A, Hoyos J, Carvajal A, Chicharro JL (1999) Heart rate response to professional cycling: The Tour de France. Int J Sports Med 20: 167172.
- Jennings D, Cormack S, Coutts AJ, Boyd L, Aughey RJ (2010) The validity and reliability of GPS units for measuring distance in team sport specific running patterns. Int J Sports Physiol Perform 5(3): 328-341.

- Sánchez Medina L, González Badillo JJ (2011) Velocity loss as an indicator of neuromuscular fatigue during resistance training. Med Sci Sports Exerc 43(9): 1725-1734
- Svedahl K, McIntosh b (2003) Anaerobic threshold: the concept and methods of measurement. Can J Appl Physiol 28: 299-323.
- Tanner RK, Fuller KL, Ross ML (2010) Evaluation of three portable blood lactate analysers: Lactate Pro, Lactate Scout and Lactate Plus. Eur J Appl Physiol 109(3): 551-559.

10. EDUCATIONAL GUIDANCE, DIVERSITY AND INCLUSION UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students' inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by mean of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunity for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:
orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the "surveys" section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.