



# Syllabus: Introduction to Programming in R for Physical Data Analysis



## ☰ Justification

### SYLLABUS

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## ☰ Objectives

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### TOPICS

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## ☰ Topic 1. Data Exploration, Transformation, and Cleaning.

 **Topic 2. Metric Calculation, Database Cross-Referencing.**

 **Topic 3. Advanced Data Visualization.**

 **Topic 4. Use of Statistical Models Applied to Physical Performance.**

 **ANEXO 1**

# Justification

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The analysis of physical performance data has experienced significant growth and importance in recent years within professional sports clubs and organizations. The use of programming languages such as R has been crucial for handling large volumes of data from various sources (GPS, force platforms, questionnaires, accelerometers, etc.).

The insights gained from these analyses have a major impact on daily decision-making across different departments (Physical Preparation, Medical Staff, Scouting, etc.), adding value to the work of Sport Scientists and achieving a greater impact on team/club performance.

This profile of Sport Scientist is highly sought after in top-level clubs, and job descriptions specify these competencies as essential for professional hiring. However, there are currently no courses focused on learning programming languages like R applied to physical performance data, nor are there subjects related to these topics in undergraduate programs. Therefore, acquiring this specific skill can be a distinguishing factor in this highly competitive sector.

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# Objectives

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By establishing objectives, we give ourselves a clear idea of what we want to achieve once the teaching and learning process of this course has finished. But our aims are even more specific: we also want to establish what you will need to accomplish in order for this new knowledge to contribute to your educational goals.

To achieve these objectives, you must complete the entire process laid out in the different stages of the course.

Thus, if you work in the way suggested, you will be well-positioned to meet the following objectives:

## General objective

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Develop programming skills in R for physical performance data analysis.

## Specific objectives

1

Understand the software, its functionalities, and opportunities.

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2

Follow the steps for the correct data analysis process.

3

Encourage the development of proposals related to physical performance using data analysis.

4

Communicate results effectively and impactfully.

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# Competencies

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The skills we hope you will develop throughout this course are:

## General Competencies

- 1** **Group and collaborative work:** the ability to work with colleagues in order to accomplish shared goals and to achieve the synergy typical of a high performance group.
- 2** **The capacity of analysis/reflection:** the capacity to methodically examine the different aspects of a certain reality or situation and to carry out an assessment of that situation.
- 3** **Creativity and innovative, knowledge-based solutions:** the capacity to find alternative solutions to existing problems based on formal knowledge.

## Specific Competency

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This program aims to develop the necessary programming skills in students to achieve the highest effectiveness in data handling. Additionally, it promotes the growth of critical thinking in selecting statistical models and visualizations for solving performance-related issues using data analytics.

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## Graduate profile

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The certificate will provide graduates with the knowledge, skills, and abilities required to excel in the field of physical performance. Graduates will gain the skills to contribute to a professional team structure by adding value through data analysis, offering valid solutions and information for decision-making.

Graduates will be able to use data as a facilitating tool in short, medium, and long-term projects required in the role of a Sport Scientist. The certificate will provide a structured approach to problem-solving, including question analysis, data structuring for subsequent use, selection of appropriate methodology, and communication of results.

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## Aim to

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Professionals interested in sports science and physical performance with no prior experience in programming or database management who wish to acquire advanced tools for physical data analysis and visualization..

Individuals keen on researching and seeking answers to improve physical performance, reduce injury risk, or innovate in professional sports.

Profiles seeking to make a multidisciplinary impact in professional clubs or those who wish to bridge the academic and professional realms.

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# Criteria for participation and approval

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## Participation criteria

During the month of course, the student is expected to:

- Browse the multimedia contents of each of the modules that make up the course.
- Solve the evaluations assigned in each module.
- Carry out the proposed activities, whether group or individual.
- Take the final exam.

## Approval criteria

For the approval of the course, the student is required to complete the (4) proposed activities in the course and pass the final exam. The student must obtain a final score of 70% or more. This grade will be the average between the activities and the final exam.

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# Topic 1. Data Exploration, Transformation, and Cleaning.

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## Topic 2. Metric Calculation, Database Cross-Referencing.

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## Topic 3. Advanced Data Visualization.

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## Topic 4. Use of Statistical Models Applied to Physical Performance.

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# ANEXO 1

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Programa del Certificado / Diplomatura (completar anexo 1 para todo el Certificado / Diplomatura)

## **1. Curso 1: Introducción a la Programación en R para Análisis de Datos Físicos.**

1.1 Módulo 1: Introducción al Software y Funcionalidades.

1.2 Módulo 2: Bases y Principios del análisis de datos aplicados al rendimiento físico.

1.3 Módulo 3: Exploración, Transformación y Limpieza de datos para uso posterior.

1.4 Módulo 4: Introducción a la visualización.

## **2. Curso 2: Procesos para el Análisis Estadístico y la Visualización.**

2.1 Módulo 1: Cruce de bases de datos de distintas fuentes.

2.2 Módulo 2: Creación de métricas desde raw data.

2.3 Módulo 3: Introducción a los análisis estadísticos.

2.4 Módulo 4: Informes automatizados para la comunicación de resultados.

### **3. Curso 3: Perfiles de Rendimiento Físico, Análisis Predictivo y Dashboards Interactivos.**

3.1 Módulo 1: Analítica avanzada para determinar perfiles de rendimiento físico.

3.2 Módulo 2: Análisis de series temporales.

3.3 Módulo 3: Nuevas tendencias en el análisis del rendimiento físico.

3.4 Módulo 4: Dashboards personalizables e interactivos para la comunicación de

resultados.

## 4. Curso 4: Estudios de Caso

4.1 Módulo 1: Aplicación de la intermitencia a raw data con GPS.

4.2 Módulo 2: Plataformas de fuerza, de perfiles y detección de cambios a cálculos con raw data.

4.3 Módulo 3: Dashboard para registro de Wellness y RPE.

4.4 Módulo 4: Uso de Chat-GPT como complemento para el análisis y tratamiento de datos en RStudio.

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