



## 1. General information

Course: ANATOMY AND BIOMECHANICS OF HUMAN MOVEMENT

Type: BASIC

Degree: 314 - DEGREE IN SCIENCES OF THE PHYSICAL ACTIVITY AND OF THE SPORT

Center: 8 - FACULTY OF SPORT SCIENCES

Year: 1

Main language: Spanish

Use of additional languages:

Web site:

Code: 39303

ECTS credits: 9

Academic year: 2023-24

Group(s): 40

Duration: AN

Second language: English

English Friendly: Y

Bilingual: N

| Lecturer: JULIÁN ALCÁZAR CAMINERO - Group(s): 40 |                                         |              |                             |              |
|--------------------------------------------------|-----------------------------------------|--------------|-----------------------------|--------------|
| Building/Office                                  | Department                              | Phone number | Email                       | Office hours |
| Despacho 1.71. Edificio Sabatini                 | ACTIVIDAD FÍSICA Y CIENCIAS DEL DEPORTE | 5512/96808   | Julian.Alcazar@uclm.es      |              |
| Lecturer: LUIS MARIA ALEGRE DURAN - Group(s): 40 |                                         |              |                             |              |
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| Despacho 1.60, Edificio Sabatini                 | ACTIVIDAD FÍSICA Y CIENCIAS DEL DEPORTE | 5506         | luis.alegre@uclm.es         |              |
| Lecturer: ÁNGEL BUENDÍA ROMERO - Group(s): 40    |                                         |              |                             |              |
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|                                                  | ACTIVIDAD FÍSICA Y CIENCIAS DEL DEPORTE |              | Angel.BuendiaRomero@uclm.es |              |

## 2. Pre-Requisites

Not established

## 3. Justification in the curriculum, relation to other subjects and to the profession

Not established

## 4. Degree competences achieved in this course

## Course competences

| Code | Description                                                                                                                                                                                                                  |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A03  | Understand the scientific literature in the field of physical activity and sport in the English language and in other languages of significant presence in the scientific field.                                             |
| A04  | Knowing how to apply information and communication technologies (ICT) to the field of Physical Activity and Sports Sciences.                                                                                                 |
| A08  | Understand and use common handbooks, as well as manuscripts and, in general, leading bibliography on subjects related to physical activity and sport, in order to prepare reports or solve specific problems that may arise. |
| B01  | Know and understand the object of study of the Physical Activity and Sport Sciences.                                                                                                                                         |
| B02  | Know and understand the object of study of the Physical Activity and Sport Sciences.                                                                                                                                         |
| B03  | Know and understand the physiological and biomechanical factors that condition the practice of physical activity and sport.                                                                                                  |
| B05  | Know and understand the effects of the practice of physical exercise on the structure and function of the human body.                                                                                                        |
| B13  | Apply the physiological, biomechanical, behavioral and social principles to the different fields of physical activity and sport.                                                                                             |
| M111 | To acquire the basic knowledge of anatomy required to analyse the functions of the locomotive system during movement.                                                                                                        |
| M113 | To analyze exercise programs following anatomical criteria                                                                                                                                                                   |
| M114 | To apply basic mechanical principles in the analysis of physical activity and sports performance.                                                                                                                            |
| M115 | To describe the movement and related forces.                                                                                                                                                                                 |
| M116 | To explain the causes of movement and balance.                                                                                                                                                                               |
| M117 | To be aware of different methodologies (both, basic and complex) designed to analyse the human movement.                                                                                                                     |
| M118 | To apply theoretical and practical knowledge and skills in the analysis of a sport chosen by the student.                                                                                                                    |

## 5. Objectives or Learning Outcomes

## Course learning outcomes

## Description

Apply biomechanical analysis of a technical gesture to the teaching of sports skills.

Apply the basic biomechanical principles associated to the movement and states of balance to improve efficiency and reduce injuries in sports practice.

Use basic anatomical vocabulary to describe any function and movement of the human body.

Select exercises and tasks according to the characteristics and problems of the subject being treated.

Recognize the muscles and joints involved in different movements identifying their functions.

Differentiate the characteristics and structures of bones, muscles and joints.

Identify the functions of the different systems of the human body.

Use motion analysis methodologies to analyze the practice of physical activity and sport.

**6. Units / Contents****Unit 1: Context of Biomechanics**

- Unit 1.1** Definitions
- Unit 1.2** Objectives of Biomechanics of Human Movement
- Unit 1.3** Areas of Biomechanics
- Unit 1.4** Subdivisions of Biomechanics
- Unit 1.5** History of Biomechanics
- Unit 1.6** Sports Biomechanics in Spain
- Unit 1.7** Biomechanics in the study plans
- Unit 1.8** Basic literature
- Unit 1.9** Biomechanics resources in the Internet

**Unit 2: Measuring in Biomechanics. Magnitudes**

- Unit 2.1** Quantitative and qualitative methodologies
- Unit 2.2** Definition of magnitude
- Unit 2.3** Fundamental and derived magnitudes
- Unit 2.4** Scalar and vectorial magnitudes
- Unit 2.5** Units
- Unit 2.6** Relativity of measurements
- Unit 2.7** Reference systems
- Unit 2.8** Space reference terms in Biomechanics
- Unit 2.9** Validity, objectivity and reliability

**Unit 3: Types of motion**

- Unit 3.1** Types of motion
- Unit 3.2** Linear motion
- Unit 3.3** Angular motion
- Unit 3.4** Special types of motion

**Unit 4: Newton's laws**

- Unit 4.1** First law
- Unit 4.2** Second law
- Unit 4.3** Third law

**Unit 5: Torque****Unit 6: Balance**

- Unit 6.1** Center of gravity
- Unit 6.2** Mechanical variables of balance
- Unit 6.3** Types of balance
- Unit 6.4** Strategies to recover balance

**Unit 7: Muscle mechanics**

- Unit 7.1** Mechanical determinants of muscle strength
- Unit 7.2** Hill's equation. Force-velocity relationship
- Unit 7.3** Torque
- Unit 7.4** Muscle architecture

**Unit 8: Tissue and material properties**

- Unit 8.1** Types of stress
- Unit 8.2** Stress-strain relationship. Hooke's law. Young's modulus
- Unit 8.3** Mechanical responses of living tissues to stress

**Unit 9: Introduction to anatomy of the locomotor system****Unit 10: Types of movement and joint axes****Unit 11: Basics of osteology****Unit 12: Basics of arthrology****Unit 13: Basics of myology and soft tissues****Unit 14: Neuromuscular skeletal structure and reflex arcs****Unit 15: Osteology of the upper limb****Unit 16: Arthrology of the upper limb****Unit 17: Myology of the upper limb****Unit 18: Osteology of the trunk and thorax****Unit 19: Arthrology and myology of the trunk and thorax****Unit 20: Osteology of the lower limb****Unit 21: Arthrology and myology of the lower limb****Unit 22: Anatomy of the nervous system****ADDITIONAL COMMENTS, REMARKS**

There will be practical classes (laboratories) both in Anatomy and Biomechanics, where the contents of the theoretical classes will be applied.

**7. Activities, Units/Modules and Methodology**

| Training Activity              | Methodology | Related Competences<br>(only degrees before RD<br>822/2021) | ECTS | Hours | As | Com | Description |
|--------------------------------|-------------|-------------------------------------------------------------|------|-------|----|-----|-------------|
| Class Attendance (theory) [ON- | Lectures    | A03 A08 B01 B02 B03 B13                                     | 1.2  | 30    | Y  | Y   |             |

|                                                                             |                        |                                        |          |                                              |   |   |  |
|-----------------------------------------------------------------------------|------------------------|----------------------------------------|----------|----------------------------------------------|---|---|--|
| Laboratory practice or sessions [ON-SITE]                                   | Combination of methods | A04 A08 B03 B13 M114 M117 M118         | 0.6      | 15                                           | Y | Y |  |
| Study and Exam Preparation [OFF-SITE]                                       | Self-study             | A03 A08 B01 B02 B03 B13 M114 M115 M116 | 1        | 25                                           | Y | Y |  |
| Practicum and practical activities report writing or preparation [OFF-SITE] | Self-study             | A04 A08 B03 B13 M114 M117 M118         | 1.7      | 42.5                                         | Y | Y |  |
| Class Attendance (theory) [ON-SITE]                                         | Lectures               | B01 B03 M114 M115                      | 1.2      | 30                                           | Y | Y |  |
| Class Attendance (practical) [ON-SITE]                                      | Combination of methods | B01 B02 B03 M111 M118                  | 0.6      | 15                                           | Y | Y |  |
| Study and Exam Preparation [OFF-SITE]                                       | Self-study             | B03 B05 B13 M118                       | 2.7      | 67.5                                         | Y | Y |  |
| <b>Total:</b>                                                               |                        |                                        | <b>9</b> | <b>225</b>                                   |   |   |  |
| <b>Total credits of in-class work: 3.6</b>                                  |                        |                                        |          | <b>Total class time hours: 90</b>            |   |   |  |
| <b>Total credits of out of class work: 5.4</b>                              |                        |                                        |          | <b>Total hours of out of class work: 135</b> |   |   |  |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

| 8. Evaluation criteria and Grading System |                       |                            |              |
|-------------------------------------------|-----------------------|----------------------------|--------------|
| Evaluation System                         | Continuous assessment | Non-continuous evaluation* | Description  |
| Progress Tests                            | 7.50%                 | 0.00%                      | BIOMECHANICS |
| Final test                                | 35.00%                | 50.00%                     | BIOMECHANICS |
| Progress Tests                            | 7.50%                 | 0.00%                      | ANATOMY      |
| Final test                                | 35.00%                | 50.00%                     | ANATOMY      |
| Laboratory sessions                       | 7.50%                 | 0.00%                      |              |
| Laboratory sessions                       | 7.50%                 | 0.00%                      |              |
| <b>Total:</b>                             | <b>100.00%</b>        | <b>100.00%</b>             |              |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

The evaluation activities will be adapted for the foreign student, according to his/her Spanish and English level.

##### Non-continuous evaluation:

The evaluation activities will be adapted for the foreign student, according to his/her Spanish and English level.

#### Specifications for the resit/retake exam:

No further specifications.

| 9. Assignments, course calendar and important dates                                     |       |
|-----------------------------------------------------------------------------------------|-------|
| Not related to the syllabus/contents                                                    |       |
| Hours                                                                                   | hours |
| Unit 1 (de 22): Context of Biomechanics                                                 |       |
| Activities                                                                              | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 4     |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 3.2   |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 6     |
| Unit 2 (de 22): Measuring in Biomechanics. Magnitudes                                   |       |
| Activities                                                                              | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 4     |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 3.2   |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 6.5   |
| Unit 3 (de 22): Types of motion                                                         |       |
| Activities                                                                              | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 4     |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 3.2   |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 6.5   |
| Unit 4 (de 22): Newton's laws                                                           |       |
| Activities                                                                              | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 4     |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 3.2   |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 6.5   |
| Unit 5 (de 22): Torque                                                                  |       |

|                                                                                         |              |
|-----------------------------------------------------------------------------------------|--------------|
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 3            |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 3            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 3            |
| <b>Unit 6 (de 22): Balance</b>                                                          |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 5            |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 4.2          |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 5.5          |
| <b>Unit 7 (de 22): Muscle mechanics</b>                                                 |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 3            |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 2.5          |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 4.25         |
| <b>Unit 8 (de 22): Tissue and material properties</b>                                   |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 3            |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 2.5          |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 4.25         |
| <b>Unit 9 (de 22): Introduction to anatomy of the locomotor system</b>                  |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 10 (de 22): Types of movement and joint axes</b>                                |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 4            |
| <b>Unit 11 (de 22): Basics of osteology</b>                                             |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 12 (de 22): Basics of arthrology</b>                                            |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 4            |
| <b>Unit 13 (de 22): Basics of myology and soft tissues</b>                              |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 3            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 14 (de 22): Neuromuscular skeletal structure and reflex arcs</b>                |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5.5          |
| <b>Unit 15 (de 22): Osteology of the upper limb</b>                                     |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 3            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 16 (de 22): Arthrology of the upper limb</b>                                    |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 17 (de 22): Myology of the upper limb</b>                                       |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 3            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 18 (de 22): Osteology of the trunk and thorax</b>                               |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |

|                                                                                         |              |
|-----------------------------------------------------------------------------------------|--------------|
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 19 (de 22): Arthrology and myology of the trunk and thorax</b>                  |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 20 (de 22): Osteology of the lower limb</b>                                     |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Unit 21 (de 22): Arthrology and myology of the lower limb</b>                        |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 2            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 4            |
| <b>Unit 22 (de 22): Anatomy of the nervous system</b>                                   |              |
| <b>Activities</b>                                                                       | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 1            |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 5            |
| <b>Global activity</b>                                                                  |              |
| <b>Activities</b>                                                                       | <b>hours</b> |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 25           |
| Laboratory practice or sessions [PRESENCIAL][Combination of methods]                    | 15           |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study] | 42.5         |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 30           |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]                       | 15           |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                       | 67.5         |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                        | 30           |
| <b>Total horas: 225</b>                                                                 |              |

| 10. Bibliography and Sources |                                                                          |                               |           |                   |      |                                                                                                                                          |
|------------------------------|--------------------------------------------------------------------------|-------------------------------|-----------|-------------------|------|------------------------------------------------------------------------------------------------------------------------------------------|
| Author(s)                    | Title/Link                                                               | Publishing house              | City      | ISBN              | Year | Description                                                                                                                              |
| Blazevich, Anthony           | Sports biomechanics: the basics : optimising human performan             | Bloomsbury                    |           | 978-1-4081-2749-0 | 2012 | Libro de biomecánica aplicada al deporte con numerosos ejemplos aplicados.                                                               |
| Fucci, Sergio                | Biomecánica del aparato locomotor aplicada al acondicionamiento muscular | Elsevier                      |           | 84-8174-645-2     | 2003 | Libro con un enfoque anatómico que incluye excelentes ilustraciones de la musculatura implicada en diferentes ejercicios de musculación. |
| Gilroy AM                    | Prometheus. Atlas de Anatomía                                            | Editorial Médica Panamericana |           | 978-84-7903-600-3 | 2008 |                                                                                                                                          |
| Izquierdo, Mikel             | Biomecánica y bases neuromusculares de la actividad física y             | Editorial Médica Panamericana |           | 978-84-0935-023-4 | 2008 | Compendio de capítulos sobre diferentes aspectos de la Biomecánica. Es el libro reciente más completo en español sobre el tema.          |
| Kapandji, A I                | Fisiología articular. Volúmenes I, II y III.                             | Médica Panamericana.          | Madrid    | 978-84-9835-461-4 | 2010 | Libros con excelentes esquemas anatómicos y biomecánicos                                                                                 |
| Latarjet M, Ruiz Liard A.    | Anatomía humana. Tomos I y II                                            | Médica Panamericana.          | Madrid    |                   | 2004 | Atlas clásico de anatomía humana                                                                                                         |
| Netter F.H.                  | Atlas de Anatomía Humana.                                                | Masson                        | Barcelona |                   | 1999 | Atlas clásico de anatomía humana                                                                                                         |
| Neumann, D.                  | Fundamentos de rehabilitación física                                     | Paidotribo                    | Madrid    |                   | 2007 | Libro que relaciona estructura anatómica y función de manera clara con excelentes ilustraciones                                          |
| Sobotta, J; VV.AA            | Anatomía humana. Tomos I y II                                            | Médica Panamericana.          | Madrid    | 84-7903191-3      | 1993 | Atlas clásico de anatomía humana                                                                                                         |
| Williams P, Warwick R.       | Gray. Anatomía. Volúmenes I y II                                         | Alhambra-Longman              | Madrid    | 84-205-2298-8     | 1992 | Libro clásico de anatomía descriptiva<br>Libro de tapa blanda con                                                                        |

|                                      |                                                                                    |                                            |          |                   |      |                                                                                                                                                        |
|--------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------|----------|-------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delavier F                           | Guía de los movimientos de musculación                                             | Paidotribo                                 | Badalona | 84-8019-388-3     | 2006 | buenas ilustraciones de gestos empleados en musculación y sus relaciones anatómicas                                                                    |
| Aguado Jódar, Xavier                 | Biomecánica fuera y dentro del laboratorio                                         | Universidad, Secretariado de Publicaciones |          | 84-7719-626-5     | 1997 | Libro sobre prácticas de laboratorio con metodologías sencillas y sofisticadas.                                                                        |
| Aguado Jódar, Xavier                 | Eficacia y técnica deportiva : análisis del movimiento humano                      | Inde                                       |          | 84-87330-20-7     | 1993 | Libro básico sobre Biomecánica aplicada al deporte. Tiene un enfoque cualitativo, con numerosos ejemplos aplicados a la educación física y el deporte. |
| Alegre, Luis María                   | Causas de la traslación lineal de los cuerpos                                      | Editorial Médica Panamericana              |          | 978-84-0935-023-4 | 2008 | Capítulo con orientación docente sobre las leyes de Newton, explicadas de forma cualitativa                                                            |
| Bartlett, Roger                      | Sports biomechanics : reducing injury and improving performance                    | E & FN Spon Routledge                      |          | 0-419-18440-6     | 1999 | Libro de Biomecánica aplicada al deporte que incluye capítulos sobre las propiedades de los materiales y tejidos. Presenta un enfoque cuantitativo.    |
| Blazevich, Anthony                   | Biomecánica deportiva :manual para la mejora del rendimiento                       | Paidotribo                                 |          | 978-84-9910-071-5 | 2011 |                                                                                                                                                        |
| McGinnis, Peter Merton               | Biomechanics of sport and exercise                                                 | Human Kinetics                             |          | 0-87322-955-X     | 1999 | Libro con muy buenos ejemplos aplicados al deporte. Explicaciones claras de conceptos básicos.                                                         |
| Viladot Voegeli, Antonio             | Lecciones básicas de biomecánica del aparato locomotor / Ant                       | Springer Verlag Iberica                    |          | 84-07-00198-8     | 2001 |                                                                                                                                                        |
| Morin, Jean-Benoit; Samozino, Pierre | Biomechanics of Training and Testing: Innovative Concepts and Simple Field Methods | Springer                                   |          | 978-3319056326    | 2018 |                                                                                                                                                        |