



## Teaching Guide

| Teaching Guide      |   |        |  |           |
|---------------------|---|--------|--|-----------|
| Identifying Data    |   |        |  | 2023/24   |
| Subject (*)         | Learning and Motor Control  |        | Code   | 620G01012 |
| Study programme     | Grao en Ciencias da Actividade Física e do Deporte  |        |  |           |
| Descriptors         |   |        |  |           |
| Cycle               | Period  | Year   | Type   | Credits   |
| Graduate            | 1st four-month period   | Second | Basic training   | 6         |
| Language            | Spanish   |        |  |           |
| Teaching method     | Face-to-face  |        |  |           |
| Prerequisites       |   |        |  |           |
| Department          | Educación Física e Deportiva  |        |  |           |
| Coordinador         | Sanchez Molina, Jose Andres   | E-mail | jose.andres.sanchez.molina@udc.es  |           |
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| Web                 | <a href="https://inefg.udc.es/index.php/grupos-de-investigacion/aprendizaje-y-control-del-movimiento-humano-en-actividad-fisica-y-deporte">https://inefg.udc.es/index.php/grupos-de-investigacion/aprendizaje-y-control-del-movimiento-humano-en-actividad-fisica-y-deporte</a>   |        |  |           |
| General description | Motor control is a scientific discipline that attempts to answer the basic question of how humans control movement. This discipline is nothing more than an attempt to integrate many other sciences that ask the same question, but that historically have not been related to each other. Psychology, neurophysiology or neurology are examples of sciences that have contributed a great deal of knowledge about the functioning of the nervous system and its role in human movement but which have maintained, until not long ago, a discourse isolated from each other. This does not mean that motor control is the "discipline" that will ultimately resolve all our doubts, but rather that it reflects the importance of approaching human movement with a multidisciplinary or, rather, interdisciplinary approach, given that it is the only way to understand how human beings control their movements with intention. |        |  |           |

## Study programme competences

| Code | Study programme competences  |
|------|--|
| A14  | Deseñar, planificar, avaliar técnico-científicamente e desenvolver programas de exercicios orientados á prevención, a reeducación, a recuperación e readaptación funcional nos diferentes ámbitos de intervención: educativo, deportivo e de calidade de vida, considerando, cando fose necesario as diferenzas por idade, xénero, ou discapacidade. |
| A22  | Comprender os fundamentos neurofisiolóxicos e neuropsicolóxicos subxacentes ao control do movemento e, de ser o caso, ás diferenzas por xénero. Ser capaz de realizar a aplicación avanzada do control motor na actividade física e o deporte.   |
| A27  | Aplicar os principios cinesiolóxicos, fisiolóxicos, biomecánicos, comportamentais e sociais nos contextos educativo, recreativo, da actividade física e saúde e do adestramento deportivo, recoñecendo as diferenzas biolóxicas entre homes e mulleres e a influencia da cultura de xénero nos hábitos de vida dos participantes.                    |
| A35  | Coñecer e saber aplicar o método científico nos diferentes ámbitos da actividade física e o deporte, así como saber deseñar e executar as técnicas de investigación precisas, e a elección e aplicación dos estatísticos adecuados.  |
| B1   | Coñecer e posuír a metodoloxía e estratexia necesaria para a aprendizaxe nas ciencias da actividade física e do deporte.   |
| B2   | Resolver problemas de forma eficaz e eficiente no ámbito das ciencias da actividade física e do deporte.   |
| B3   | Traballar nos diferentes contextos da actividade física e o deporte, de forma autónoma e con iniciativa, aplicando o pensamento crítico, lóxico e creativo.  |
| B4   | Trabajar de forma colaboradora, desenvolvendo habilidades, de liderado, relación interpersoal e traballo en equipo.  |
| B5   | Comportarse con ética e responsabilidade social como cidadán.  |
| B7   | Xestionar a información.   |
| B9   | Comprender a literatura científica do ámbito da actividade física e o deporte en lingua inglesa e en outras linguas de presenza significativa no ámbito científico.  |
| B10  | Saber aplicar as tecnoloxías da información e comunicación (TIC) ao ámbito das Ciencias da Actividade Física e do Deporte.   |
| B11  | Desenvolver competencias para a adaptación a novas situacións e resolución de problemas, e para a aprendizaxe autónoma.  |



|     |   |
|-----|---|
| B12 | Coñecer os principios éticos necesarios para o correcto exercicio profesional e actuar de acordo con eles.  |
| B13 | Coñecer e aplicar metodoloxías de investigación que faciliten a análise, a reflexión e cambio da súa práctica profesional, posibilitando a súa formación permanente.  |
| B16 | Dominar habilidades de comunicación verbal e non verbal necesarias no contexto da actividade física e o deporte.  |
| B20 | Coñecer, reflexionar e adquirir hábitos e destrezas para a aprendizaxe autónoma e o traballo en equipo a partir das prácticas externas en algún dos principais ámbitos de integración laboral, en relación ás competencias adquiridas no grao que se verán reflectidas no traballo fin de grao. |
| C1  | Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.  |
| C2  | Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.   |
| C3  | Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.   |
| C4  | Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.  |
| C5  | Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras.  |
| C6  | Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.   |
| C7  | Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.  |
| C8  | Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.   |

| Learning outcomes   |                             |     |    |
|---|-----------------------------|-----|----|
| Learning outcomes   | Study programme competences |     |    |
| Know and comprise the foundations neurofisiolóxicos and neuropsicolóxicos underlying to the control of the human movement and his development   | A22                         | B2  | C1 |
|   | A27                         | B5  | C2 |
|   |                             | B10 | C6 |
|   |                             | B13 |    |
| Be able to realise the application advanced of the control and learning engine in the fields of performance of the physical activity and of the sport, and , in his case, considering the differences by gender | A14                         | B1  | C3 |
|   | A27                         | B2  | C4 |
|   | A35                         | B3  | C5 |
|   |                             | B4  | C6 |
|   |                             | B5  | C7 |
|   |                             | B7  | C8 |
|   |                             | B9  |    |
|   |                             | B10 |    |
|   |                             | B11 |    |
|   |                             | B12 |    |
|   |                             | B13 |    |
|   |                             | B16 |    |
|   |                             | B20 |    |

| Contents   |   |
|--|---|
| Topic  | Sub-topic   |
| Thematic block 1. Introduction to learning and motor control | Topic 1.1 Conceptualization and History of learning and motor control |
|  | Topic 1.2 Motor behavior and measurement                              |
|  | Topic 1.3 Model of information processing and decision making         |
|  | Topic 1.4. Conditions for the processing of information               |



|   |   |
|---|---|
| Thematic block 2. Neurophysiological bases of motor control | Topic 2.1 Collection of sensory information for movement control<br>Topic 2.2 Spinal control of movement<br>Topic 2.3 Cortical control of movement<br>Topic 2.4 Subcortical motion control: Basal Ganglia<br>Topic 2.5 Subcortical motion control: Cerebellum |
| Thematic block 3. Control of human movement                 | Topic 3.1 Control systems for motion execution<br>Topic 3.2 Movement production and motor program<br>Topic 3.3 Principles of motor control and movement accuracy<br>Topic 3.4 Individual differences and motor skills   |
| Thematic block 4. Principles of motor learning              | Topic 4.1 Motor learning<br>Topic 4.2 Implementation of motor learning<br>Topic 4.3 Structuring of learning<br>Topic 4.4 Feedback during learning   |

| Planning  |  |                      |                               |             |
|---|--|----------------------|-------------------------------|-------------|
| Methodologies / tests   | Competencies                                 | Ordinary class hours | Student's personal work hours | Total hours |
| Introductory activities   | B7 C6  | 1                    | 0.4                           | 1.4         |
| Guest lecture / keynote speech  | A22 A35 B7 C4 C5<br>C7                       | 26                   | 67.6                          | 93.6        |
| Laboratory practice   | A22 A35 B4 B12 B20<br>C3 C6 C8               | 16                   | 12                            | 28          |
| Objective test  | A22 B7 B9 B13 C3                             | 2.5                  | 5                             | 7.5         |
| Mixed objective/subjective test   | A14 A27 B1 B2 B9<br>B10 B11 B13 B16 C1<br>C2 | 2                    | 0                             | 2           |
| Clinical practice placement   | B2 B3 B5 B7 B13 C8                           | 0                    | 7.5                           | 7.5         |
| Events academic / information   | B3 B5 B7 C7 C8                               | 0                    | 7.5                           | 7.5         |
| Personalized attention  |  | 2.5                  | 0                             | 2.5         |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. |  |                      |                               |             |

| Methodologies                   |   |
|---------------------------------|---|
| Methodologies                   | Description   |
| Introductory activities         | <p>A complete explanation of the aspects addressed in the teaching guide will be explained the first day of class in order that students know the skills that are intended to acquire.</p> <p>In the same way prior to the completion of any of the proposed works and activities, the necessary information will be provided and the students will be organized for their optimal development.</p>   |
| Guest lecture / keynote speech  | The fundamental contents will be taught through a magisterial session, although will be demanded an active participation of the students, presenting problems and questions to solve.   |
| Laboratory practice             | Laboratory practices will be carried out on the theoretical contents taught in the subject. In each practice the student will participate as an evaluator and as an experimental subject.   |
| Objective test                  | Questionnaires with objective questions will be used, mainly through the Virtual Campus, with the intention of stimulating students to keep abreast of the contents raised in previous sessions or even in the session itself, as well as to encourage the readings associated with the syllabus; it will also serve to determine student participation. Students with lower scores may be asked to develop questionnaires to be presented in a future session. |
| Mixed objective/subjective test | A exam t that can integrate questions such as essay tests and question type of objective tests. As for essay questions, it gathers open questions of development. In addition, as objective questions, you can combine multiple-choice, ordering, brief response, discrimination, completion, and / or association questions.   |
| Clinical practice placement     | Participation as experimental subject or as assistant in studies developed in the "Group of learning and control of human movement in physical activity and sport (ACoM)"   |



|                               |   |
|-------------------------------|---|
| Events academic / information | Participate in scientific and / or informative events related to the contents of the subject. |
|-------------------------------|---|

## Personalized attention

| Methodologies  | Description   |
|--|---|
| Laboratory practice<br>Guest lecture /<br>keynote speech | <ul style="list-style-type: none"><li>- Queries or questions raised by students will be solved individually through previously agreed meetings.</li><li>- E-mail and MSTEams are the basic tools for consulting, for resolving specific doubts and for arranging face-to-face or virtual meetings.</li><li>- The tutoring schedules of the subject, programmed by the center, will make it possible to complete, in small groups, the tasks not developed in the laboratory sessions of the official schedule.</li><li>- Students enrolled part-time will have the same consideration as students enrolled full-time; see also Evaluation, section 6, observations.</li></ul> |

## Assessment

| Methodologies                   | Competencies                                 | Description   | Qualification |
|---------------------------------|--|---|---------------|
| Events academic / information   | B3 B5 B7 C7 C8                               | The criterion of equivalence of 0.1 points of the final grade for each hour of activity up to a maximum of 0.75 points is established in this methodology.<br>If the student does not participate in this methodology or the final score obtained in this section is lower than the mixed test score its percentage will be included in the percentage of the mixed test. | 7.5           |
| Clinical practice placement     | B2 B3 B5 B7 B13 C8                           | The criterion of equivalence of 0.1 points of the final grade for each hour of activity up to a maximum of 0.75 points is established in this methodology.<br>If the student does not participate in this methodology or the final score obtained in this section is lower than the mixed test score its percentage will be included in the percentage of the mixed test. | 7.5           |
| Laboratory practice             | A22 A35 B4 B12 B20<br>C3 C6 C8               | It will be mandatory the inclusion, in the established digital platform/application, of the data obtained in the practices; this will allow the analysis of the same, generate new approaches and answer related questions through questionnaires or new practical situations.  | 30            |
| Mixed objective/subjective test | A14 A27 B1 B2 B9<br>B10 B11 B13 B16 C1<br>C2 | Test done at the end of the subject, on scheduled exam date.  | 40            |
| Objective test                  | A22 B7 B9 B13 C3                             | During the course, a series of objective tests related to the theoretical contents will be presented through the virtual campus, which can be carried out during the on-site classes themselves, in order to motivate attendance, continuous study and the resolution of doubts.  | 15            |

## Assessment comments



## 1. Attendance:

Attendance is required for the evaluation of the methodology "laboratory practices".2. The minimum percentage of attendance to be eligible for the evaluation of the laboratory practices will be 70% (medium and practice group):

In the event of non-attendance, for justified reasons, accredited by documentation) it will be possible to request the realization of the practice in tutoring schedule of the teacher who has taught it, in the period established for its possible recovery.3. Assessment according to opportunity:

1st opportunity:Regarding the performance of the mixed test:The result of the mixed test must be equal to or higher than 5.00 to make the weighted average with the remaining elements of the evaluation. On the exam paper, the score for each question will be made explicit in the event that the questions have a different value.Regarding the "laboratory practices" and "objective tests" methodologies: the result of your mark must be equal to or higher than 5.00 in order to carry out the weighted average of the remaining assessment elements. The mark will be obtained according to the activities and tests proposed during the academic year.The weighted average result of the different assessment elements must be equal to or higher than 5.00 to pass the subject.With regard to the exam sittings: each sitting consists of two opportunities (June and July); when in the same sitting a grade of "failed" is obtained in one opportunity and "failed" in the other, the grade will be recorded as "failed" in the sitting.You can choose to do only the "clinical trial" methodology or only the "scientific and/or informative events" methodology, in which case you can obtain up to 1.5 points in either of the two sections.In the event that clinical internships" and/or "scientific and/or informative events" cannot be offered, or the students cannot or do not wish to do them; or in case of doing them, their score is lower than the one obtained in the mixed test its percentage in the assessment shall be incorporated into that of the mixed test, so as not to affect the final grade.2nd opportunity:The same requirements as in the 1st opportunity are maintained.If the compulsory internship has not been completed and/or objective tests, it must be carried out in the following academic year.4. Criteria for maintaining parts passed at the 2nd opportunity:

The qualifications obtained in any of the evaluation sections achieved in the first opportunity of each call will be maintained, if the student so wishes.5. Criteria for maintaining parts passed in future examinations:

The scores obtained in any of the activities corresponding to the methodologies contemplated for evaluation, achieved in previous sessions will be maintained, except in the case of a possible change of the teachers of the subject.The criteria for the extraordinary convocations will be the same as those already established.6. Students with partial matriculation:

1st opportunity:The assessment will be carried out in the same way as for the rest of the students with full enrolment.Objective tests: access will be facilitated in a different period if you cannot be taken in the previously established one.Laboratory practices: it will be possible to request the realization of the practice in tutoring schedule of the teacher who has taught it, in the period established for its possible recovery.2nd opportunity:The assessment will be carried out in the same way as for the rest of the students with full enrolment.7. Availability of languages in relation to the written assessment exams (not only the final exam):

Mixed test, objective test and those related to laboratory practices will be given to students in the language in which the subject is taught (Spanish).Those who wish to take the mixed test in another official language of the UDC must request it during the first month of the term in which the subject is imparted.8. Assessment alternatives for justified special cases:

Each existing case will be dealt with on a case-by-case basis, taking into account its circumstances, without detriment to the learning outcomes.9. For online tests, if any, the UDC platform or systems recognised by the UDC will be used.

## 10. Implications of academic fraud in the performance of tests or assessment activities:

Fraudulent performance of tests or assessment activities will directly imply a grade of "0" in the subject and in the corresponding exam call, thus invalidating any grade obtained in all assessment activities with a view to the extraordinary exam call.In addition, according to the University Coexistence Law (BOE No. 48, of February 25, 2022), academic fraud is considered a very serious offense, and may result in expulsion from the university for 2 to 3 years, which will be recorded in the academic record until it is fully complied with; as well as the loss of partial enrollment rights for one academic year or semester (art. 14). Academic fraud is understood to be any premeditated behavior aimed at falsifying the results of an exam or work, whether one's own or someone else's, taken as a requirement to pass a subject or to accredit academic performance (art. 11).



|                      |   |
|----------------------|---|
| <b>Basic</b>         | <ul style="list-style-type: none"> <li>- Fernández del Olmo, Miguel Á. (2012). Neurofisiología aplicada a la actividad física. Madrid: Síntesis</li> <li>- Kandel, Eric R., Schwartz, James H. y Jessell, Thomas M. (2001). Principios de neurociencia (4ª ed.). Madrid: McGraw-Hill</li> <li>- Latash, Mark L. (1998). Neurophysiological basis of movement. Champaign, IL: Human Kinetics</li> <li>- Magill, Richard y Anderson, David (2017). Motor Learning and Control: Concepts and Applications. New York: McGraw-Hill Education</li> <li>- Schmidt, Richard A. y Lee, Timothy D. (2011). Motor control and learning: a behavioral emphasis (5ª ed). Champaign, IL: Human Kinetics</li> <li>- Schmidt, Richard A. y Wrisberg, Craig A. (2008). Motor learning and performance: A situation-based learning approach (4ª ed). Champaign, IL: Human Kinetics</li> </ul>   |
| <b>Complementary</b> | <ul style="list-style-type: none"> <li>- Cardinali, Daniel P. (2007). Neurociencia aplicada: sus fundamentos. Madrid: Médica Panamericana</li> <li>- Felten, David L., Shetty, Anyi N. y Netter, Frank. (2010). Atlas de Neurociencia. Barcelona: Masson</li> <li>- Goldstein, E. Bruce (2006). Sensación y percepción. Madrid : Thomson-Paraninfo</li> <li>- Martens, Rainer (2002). El entrenador de éxito. Barcelona: Paidotribo</li> <li>- Oña Sicilia, Antonio (1999). Control y aprendizaje motor. Madrid: Síntesis</li> <li>- Ponz Piedrafita, Francisco y Barber Cárcamo, A. María (1989). Neurofisiología. Madrid: Síntesis</li> <li>- Rothwell, John C. (1994). Control of human voluntary movement (2ª ed). London: Chapman &amp; Hall</li> <li>- Shumway-Cook, Anne y Woollacott, Marjorie H. (2007). Motor control: translating research into clinical practice. Philadelphia : Lippincott Williams &amp; Wilkins</li> </ul> |

## Recommendations

### Subjects that it is recommended to have taken before

### Subjects that are recommended to be taken simultaneously

Anatomy and Kinetics of Human Movement/620G01002

Psychology of Physical Activity and Sport/620G01011

Physiology of Exercise I/620G01013

### Subjects that continue the syllabus

Physical Activity and Sports Research/620G01021

Technology in Physical Activity and Sport/620G01034

### Other comments

In order to improve our school's internal quality assurance system, it would be advisable for students to respond to the request made by the UDC, every four months, to participate in the evaluation process of the subjects they have studied". This request is called "AVALIA" and consists of answering the questionnaires that evaluate the teaching of the teachers in each subject.

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.