UCAM
UNIVERSIDAD
CATÓLICA DE MURCIA

2018/2019 Course Guide

Learning, Development, and Motor Control

Bachelor's in Physical Activity and Sports Science

Mode: On Campus

Index

Tomás T. Freitas - Tel: (+34) 968 27 85 66 - tfreitas@ucam.edu

Learning, Development, and Motor Control

Module: **Basic Sciences**.

Subject: **Social Sciences.**

Level: **Basic Training.**

No. of Credits: **6 ECTS.**

Academic Session: **2nd Course – Quarterly.**

Course Professor: D. Tomás T. Freitas

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Office Hours: Monday from 9:00 to 10:00 and Thursday from 13:00 to 14:00.

Professor coordinating the Module, Subject, or Course: Dr. Aarón Manzanares Serrano.

Brief Description

The Learning, Development and Motor Control subject is made up of three areas of great consolidation of the current moment, based within the framework of Physical Activity and Sports Sciences. Based on the basic areas of psychology and neurophysiology, its principles, topics, and methods are applied to the study of the execution of movement and to the analysis of changes in the human experiences as a result of learning and development. Learning, Development and Motor Control complement each other, sharing their principles. There is a link to other subjects in the degree, especially those such as Biomechanics or Pedagogy, and the principles of Sports Psychology and Movement Physiology also apply to this course. During the course, the basic underlying process of movement coordination is examined as well as how these are modified with learning and the process of growth and maturation. Through this course, a professional of Physical Activity and Sport Sciences will know and be able to apply the tools and methodologies most commonly used for human motor behavior. By analyzing motor patterns, this will help identify the characteristics of control and of learning human movement, providing the necessary training for assessment and planning for intervention in their professional work.

Prerequisites

No prerequisites have been established.

Objectives

1. To acquire and integrate the principles, theories, factors, and processes of behavioral analysis, learning, development, and motor control in sport.
2. To acquire and integrate concepts, theories, model, and currents of sports pedagogy.
3. To know the historical origin, evolution and purpose of physical activities and sport.
4. To study Olympic movement as a paradigm of the development of modern sport.
5. To know the basics of sports sociology.

Competencies

Interdisciplinary Competencies

(CT1) Analysis and synthesis.

(CT2) Organization and planning.

(CT3) Oral and written communication in the native language.

(CT4) Knowledge of a foreign language.

(CT6) Information management.

(CT7) Problem-solving.

(CT8) Decision-making.

(CT9) Teamwork.

(CT13) Critical reasoning.

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(CT15) Autonomous learning.

(CT16) Adaptation to new situations.

(CT18) Creativity.

(CT20) Entrepreneurial initiative and spirit.

(CT21) Motivation for quality.

Specific Competencies

(CES4) To know, understand, and know how to apply the psychological and social aspects of human movement in physical activity.

(CES6) To apply the psychological, behavioral, pedagogical and social principles to the different fields of physical activity and sport.

(CES7) To know and apply scientific methods in the field of Physical Activity and Sports Sciences.

(CES9) To know and apply the most common measurements and instrumentation protocols in the field of Physical Activity and Sports Science.

(CES10) Apply Information and Communication Technologies (ICT) to the field of Physical Activity and Sports Sciences.

UCAM Competencies

(CUCAMT1) To express oneself correctly in Spanish within their disciplinary field.

(CUCAMT3) To project knowledge, abilities, and skills acquired to promote a society based on the values of freedom, justice, equality, and pluralism.

(CUCAMT4) To understand and express oneself in a foreign language within their disciplinary field.

(CUCAMT6) Able to work as a team, interacting with other people from the same or different professional field.

(CUCAMT7) To develop skills in initiating research.

Learning Outcomes

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(RA) To distinguish and relate the implications that the psychological and social aspects of human movement have on the realization of physical activity and sport.

(RA) To design physical-motor activities in which the psychological and social aspects of human movement are taken into account.

(RA) To design activities in which psychological, behavioral, pedagogical, and social principles are applied in the different field of physical activity and sport.

(RA) To distinguish and relate activities in which psychological, behavioral, pedagogical, and social principles are applied in the different fields of physical activity and sport.

(RA) To understand and distinguish the characteristics of scientific information and how to interpret it.

(RA) To interpret and use specific scientific literature of physical activity and sport for the performance of their training and professional activities.

(RA) To design and use research designs in physical activity and sports for the performance of their training and professional activities.

(RA) To understand and distinguish the characteristics of the different measurement and instrumental protocols in physical activity and sport.

(RA) To interpret the data obtained from measurements and specific instruments of physical activity and sport.

(RA) To determine and use the different measurement and instrumental protocols most appropriate in physical activity and sports for the performance of their training and professional activities.

(RA) To understand and distinguish the possibilities that different information and communication technologies have in physical activity and sport.

(RA) To use Information and Communication Technologies (ICT) for performance in training and professional activities.

Methodology

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Methodology	Hours	Hours of Classroom Work	Hours of Non-Classroom Work
Theoretical-Practical Lectures	42	60 hours (40 %)	
Seminars and workshops	12		
Evaluation	3		
Tutorials for project follow-up	3		
Student autonomous work	60		90 hours (60 %)
Applied work of the material	30		
TOTAL	150	60	90

Syllabus

Theoretical Instructional Program

Teaching Unit I: Introduction to Learning, Development, and Motor Control.

Topic 1. Fields of Study in Learning, Development, and Motor Control (LDMC).

1.1. Introduction to motor behavior

1.2. Areas of motor behavior

1.3. Fields of action in LDMC

1.4. Approaches to the study of LDMC

1.5. Featured authors in LDMC

1.6. Main publications

1.7. Basic bibliographic references for study

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Topic 2. Measurement in Learning, Development, and Motor Control.

2.1. Introduction to analysis in LDMC

2.2. Variables to be analyzed in LDMC

2.3. Basic equipment and software for data collection

2.4. The process of measuring variables

2.5. Example of a procedure for the analysis of control of human movement

2.6. Example of a procedure for the analysis of motor learning

2.7. Web resources for study

Topic 3. Motor skills: study and classification.

3.1. Introduction to the classification of motor skills

3.2. Motor skills, capacities, abilities and actions

3.3. Classification systems for motor skills

3.4. Bibliographical references

3.5. Practical applications

Teaching Unit II: Current explanatory models of Motor Development.

Topic 4. Concepts, agents of motor development and periodization.

4.1. Introduction to Motor Development

4.2. Factors and principles that govern motor development

4.3. Why study motor development under a systemic model?

4.4. Motor development in physical education classes. Considerations for decision-making

4.5. Conclusions

4.6. Bibliographical references

4.7. Practical applications

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Topic 5. Methodological approaches in the study of motor development.

5.1. Introduction

5.2. Pre-natal motor development

5.3. Post-natal motor development

5.4. Bibliographical references

5.5. Practical applications

Topic 6. Measuring Motor Development.

6.1. Introduction to the measurement of Motor Development

6.2. Assessment and measurement in Motor Development

6.3. Objectives of measurement

6.4. Nomenclature used in measurement

6.5. Recording instrumentation and assessment of milestones in Motor Development

6.6. Bibliographical references

6.7. Practical applications

Teaching Unit III: Explanatory models of Motor Control.

Topic 7. Neuro-mechanical and physiological bases of Motor Control.

7.1. Introduction to the neurophysiology of Motor Control

7.2. Structures of the nervous system involved in the control of human movement

7.3. Connectionist and neurophysiological models

7.4. Bibliographical references

7.5. Practical applications

Topic 8. Cognitive perspective and psychological processes involved in Motor control.

8.1. Approaches to the study of LDMC (common thread)

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8.2. Behavioral models based on information processing

8.3. Motor programs

8.4. Bibliographical references

8.5. Practical applications

Topic 9. Ecological approach and the Theory of Complex Dynamic Systems.

9.1. Approaches to the study of LDMC (common thread)

9.2. Behavioral models based on ecological psychology

9.3. LDMC from the Theory of Complex Dynamic Systems

9.4. Bibliographical references

9.5. Practical applications

Topic 10. Measuring Motor Development.

10.1. Electromyographic recording

10.2. Practical applications

Teaching Unit IV: Study topics in Motor Control.

Topic 11. Motor variability: coordination, synergies, and degrees of freedom.

11.1. Variability and Motor Control

11.2. Variability in the execution of movement

11.3. Variability in the result of movement

11.4. Bibliographical references

11.5. Practical applications

Topic 12. Visual skills and Motor Control.

12.1. Introduction

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12.2. The human visual system and Motor Control

12.3. Perception and sensation

12.4. Theories on perception

12.5. Recognizing motor patterns

12.6. Visual skills and perception in sports

12.7. Bibliographical references

12.8. Practical applications

Topic 13. The relationship between speed and precision in human movement.

13.1. Introduction

13.2. The speed-precision relationship

13.3. Fitts' Law

13.4. Exceptions to Fitts' Law

13.5. Bibliographical references

13.6. Practical applications

Topic 14. Motor anticipation and its optimization.

14.1. Attention and its relationship with anticipation in sports

14.2. Modalities of anticipation

14.3. Techniques for improving anticipation

14.4. Bibliographical references

14.5. Practical applications

Teaching Unit V: Motor Learning and Organization of Practice.

Topic 15. Variability in practice and differential learning.

15.1. Variability in practice

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15.2. Influencing factors in the effects of variability

15.3. Benefits of variability in practice

15.4. Initial studies on variability in motor learning

15.5. Sources of variability in practice

15.6. Applying variability in practice

15.7. Bibliographical references

15.8. Practical applications

Topic 16. Contextual Interference.

16.1. The concept of contextual interference (CI)

16.2. General results in contextual interference

16.3. Hypotheses explaining CI

16.4. Guidelines for applying CI in Motor Learning

16.5. Bibliographical references

16.6. Practical applications

Topic 17. Distribution in Practice.

17.1. Concept of distribution in practice

17.2. Concentrated and distributed practice

17.3. Effects of distribution in practice

17.4. Background in motor learning

17.5. Bibliographical references

17.6. Practical applications

Topic 18. Feedback in motor skills learning.

18.1. Concept of feedback and feedforward in Motor Learning

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18.2. Types of sensory information

18.3. Origin of information

18.4. Properties of feedback and feedforward

18.5. Guidelines for giving feedback

18.6. Examples in giving feedback

18.7. Bibliographical references

18.8. Practical applications

Topic 19. Measuring Motor Learning: Acquisition, Retention and Transference.

19.1. Concept of practice and its importance in the acquisition of motor competence

19.2. Measurement in Motor Learning: learning and performance curves

19.3. Stages of acquisition and retention in motor learning

19.4. Measuring transference

19.5. Practical applications

Practical Instructional Program

Seminar 1. Introduction to Measurement in Learning, Development, and Motor Control.

Seminar 2. Stages of information processing (Sternberg).

Seminar 3. Invariants of the motor program.

Seminar 4. Applications of the Theory of Complex Dynamic Systems to Motor Control.

Seminar 5. Electromyographic analysis.

Seminar 6. Detection and analysis of pre-indexes.

Seminar 7. Anticipation in sports.

Seminar 8. Speed-precision relationship: Fitts' Law.

Seminar 9. Motor variability.

Seminar 10. Tools for motor learning: contextual interference.

Seminar 11. Tools for motor learning: distribution in practice.

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Seminar 12. Tools for motor learning: feedback.

Relationship to Other Courses

Within the study of Social Sciences, the Learning, Development, and Motor Control course is related to other subjects, more closely with Psychology and Behavioral Analysis in Sports and with Pedagogical Fundamentals of Sport. In the same way, it relates to a lesser extent – *a restricted link to a small section of motor development* – to Historical Foundations of Sport and Sociology of Sport.

Within the Basic Sciences module, there is also a close relationship with the Biological Sciences course, demonstrating a direct and basic relationship with the Biomechanics of Sport, Physiology of Sport, and Human Anatomy courses.

Grading System

For the February/June/September Sessions:

- Written tests: 60% of the total grade, whose evaluation corresponds to the contents of the topics presented in the theoretical and practical lectures. In this case, the theoretical part of the subject will be evaluated in two eliminatory partial exams, which must each be passed independently. The value of each exam will be: the first partial 30% and the second partial 30%

- Presentations and projects: 30% of the total grade, whose evaluation corresponds to the assessment of the presentations and the projects done.

- Practical seminars: 10% of the total grade, whose evaluation corresponds to the score of the group project and the work dynamic developed in the seminars.

The student shall pass the subject when the weighted average is equal to or greater than 5 points and all the parts that make up the grading system have been passed, whose overall weight is equal to or greater than 20%.

If the student has less than 5 in any of the parts with a weight equal to or greater than 20%, the subject will be suspended, and the student must retake the part(s) in the next session within the same academic year. The suspended part(s) in official sessions (February/June) will be saved for successive sessions that are held in the same academic year.

In the case that the subject is not passed in the September session, the passed parts will not count for successive academic years.

The **grading system** (RD 1.125/2003. of September 5) shall be the following:

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0-4.9 Suspended (SS)

5.0-6.9 Passed (AP)

7.0-8.9 Excellent (NT)

9.0-10 Outstanding (SB)

Honorable mention may be granted to students who have earned a grade equal to or greater than 9.0. This number may not exceed 5% of the total number of students enrolled in a subject in the corresponding academic year, unless the number of students enrolled is less than 20, in which case only a single honorable mention may be granted.

Bibliography and Reference Sources

Basic Bibliography

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- Kuhn, D. & Lerner, R.M. (2006). *Handbook of Child Psychology (6th ed).* New York: Wiley & Sons (Teaching Unit II).
- Magill, R.A. (2004). *Motor learning and Control: Concepts and applications*. Boston: McGrawHill (Teaching Unit V).
- Moreno, F.J., Menayo, R., Luís, V. y Fuentes, J.P. (2009). *Bases del control y del aprendizaje motor aplicadas al tenis*. [*Basis of Control and Motor Learning Applied to Tennis.*] Sevilla: Wanceulen Editorial Deportiva (Teaching Unit I, II and III).
- Oña, A. Martínez, M., Moreno, F.J. y Ruiz, L. (1999). *Aprendizaje y Control Motor*. [*Learning and Motor Control.*] Madrid: Síntesis (Teaching Unit I, II and III).
- Schmidt, R.A. & Lee, T. (2005). *Motor Control and Learning: a behavioral emphasis*. Champaign, I.L.: Human Kinetics (Teaching Unit V).

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- Schmidt, R.A. & Wrisberg, C.A. (1999). *Motor Control and Performance*. Illinois: Human Kinetics.
- Zatsiorsky, V. (1998). *Kinematics of Human Motion*. Champaign, IL: Human Kinetics.
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- Zelaznik, H.N. (1996). *Advances in Motor Learning and Control*. Illinois: Human Kinetics.

Related Websites

International Society of Motor Control: http://www.i-s-m-c.org/

Motor Control: http://journals.humankinetics.com/mc

Research Group in Health, Physical Activity, Fitness, and Motor Behavior (GISAFFCOM): http://investigacion.ucam.edu/gisaffcom/

Human Movement Science:

http://www.elsevier.com/wps/find/journaldescription.cws_home/505584/description

Journal for Motor Behavior: http://www.tandf.co.uk/journals/titles/00222895.asp

Journal for Applied Behavior Analysis: http://seab.envmed.rochester.edu/jaba/

Journal for Human Movement Studies: http://www.getcited.org/pub/100488246

Research Quarterly for Exercise and Sport: http://www.aahperd.org/rc/publications/rqes/index.cfm

Culture, Science, and Sport: http://www.ucam.edu/ccd/

Motor Skills. European Journal of Human Movement: http://www.cienciadeporte.com/revista.html

Journal for Human Sport and Exercise: http://www.jhse.ua.es/index.php/jhse/jhse/presentation

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Perceptual and Motor Skills: http://www.ammonsscientific.com/AmSci/

Web of Knowledge: http://apps.isiknowledge.com/

Study Recommendations

It is recommended that students prepare individualized notes taken from the contents presented in class and to complete them with the recommended bibliography, as well as attend tutorials to answer questions or discuss issues related to the subject. It is recommended that students follow up with the subject on a daily basis and that they use all of the tools that are made available to them (the Virtual Campus, group work, and software provided by the professor) in order to completely and critically assimilate the subject content. Likewise, it is advisable to participate on an individual basis as well as in group work and discussions, in carrying out the practical cases that are presented both in class and in the various complementary activities scheduled throughout the course. The articles and research studies to be read (which will be specifically recommended) will be adjusted for the effective and efficient mastery of the basic concepts of the subject.

Teaching Materials

Students will be asked to have one laptop with a Windows operating system for each group of four people, which will be necessary to carry out the seminars on the subject. Also in class, students will need a target with 6 darts, 4 tennis balls, a stability base to perform balance exercises on one foot, a radar for mobile phones and two video cameras with the option of filming at high speed. As for the necessary software for these seminars, the following programs will be used: “Sternb”, “Fitts”, and “Kinovea”, as well as Excel, which will be provided by the professor.

Regarding the classroom, there will be computers, an audiovisual projector, internet connection, and adequate seating and lighting for the lecture classes.

Tutorials

The professor will tutor and guide the students, trying to answer possible questions related to the content of the course, guiding their studies and broadening their knowledge, providing useful sources of information and documentation, or trying to resolve specific difficulties or particular cases from certain students. In the tutorials, it is possible to create collective tutorials which are voluntary, planned

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after completing each teaching unit, and to allow students to ask questions about the subject taught up to that point.

Main tutorial actions:

- Explanation of the teaching-learning process in the subject of Learning, Development, and Motor Control.
- Propose the bases of operation, structure, and understanding of the concepts to be developed in the seminars and discussion groups.
- Advise on the selection and preparation of the work approach to Learning, Development, and Motor Control.
- Use bibliographical bases and other sources of documentation for the bibliographic search for the preparation of the projects within the subject.
- Explanation of requirements for presenting the tasks on the subject.

The University also has a Special Body of Tutors that conducts personal tutoring with the students enrolled in the degree. The personal tutor accompanies the students throughout the university phase. You can check the following link:

http://www.ucam.edu/servicios/tutorias/preguntas-frecuentes/que-es-tutoria

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