

COURSE SYLLABUS

Behavioural Neuroscience

Degree in Psychology
C.U. Cardenal Cisneros
University of Alcalá

Academic year 2024/25

1st Year – 2nd Term

STUDY GUIDE

Name of the subject:	Behavioural Neuroscience
Code:	562006
Studies:	Degree in Psychology
Department and Area of knowledge:	Psychology (Biological Basis of Behaviour)
Character:	Basic training
ECTS credits :	6
Year and Term:	1st Year, 2nd Term
Lecturer:	Ana Sofía Urraca
Office hours:	Appointment request by e-mail. Fridays from 12 to 14 hours
Office number:	33
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Language:	Spanish

1. INTRODUCTION

INTRODUCTION

This subject is part of the module *Biological Basis of Behaviour* and is a continuation of the subject *Foundations of Psychobiology* (first year, first term), and is the foundation of *Physiological Psychology* (second year, first term) and *Psychopharmacology* (third year).

The main aim of this subject is for the student to have a global vision of the neural bases of human behaviour, and to understand the way in which the nervous system is related to the main psychological processes of cognitive activity (information processing) and behaviour. Thus, it studies neuroanatomical and physiological substrates of human behaviour; observing the close relationship between its biological, cognitive and social dimensions.

It begins with a review and expansion of microscopic and macroscopic anatomy and functioning of the nervous and neuroendocrine systems, followed by anatomical and functional bases of sensory systems (vision, audition, tact, chemical senses) and the motor system. Finally, the neural bases of high-level psychological functions (e.g. language and memory) are studied.

It is noteworthy that an innovative methodology will be used in this subject, namely *dialogic talks*.

Finally, this subject is included within **the English Friendly programme**. The aim of this programme is to assist foreign students adequately. To this aim, the following resources and possibilities are available:

- There is an English version of this course syllabus.

- The foreign student will be provided with a selection of references of books and journal articles that include the contents of the subject.
- A model of the exam in English will be provided upon request.
- The teacher is available for personal tutorials and communication in English.

Nevertheless, a minimum B2 level of Spanish is recommended, as well as some basic knowledge about anatomy of the nervous system.

Prerequisites and Recommendations

To take this subject, it is highly recommended to have passed *Fundamentals of Psychobiology*, taught in the first term.

2. COMPETENCES

According to the regulations of the learning assessments of the University of Alcalá, approved in ordinary session of the Board of Directors on 24 March 2011 and modified in ordinary session of the Board of Directors on 5 May 2016, the competences are the set of knowledge, skills and attitudes that will enable a graduate to confront with confidence the resolution of problems or the intervention in an issue in a given academic, professional or social context.

Specifically, the competences that the student will have to develop in this subject are described below.

Generic competences:

GC1. To acquire the knowledge and understand the principles of Psychology as a scientific discipline, including theory, methods and application fields, with the support of advanced textbooks and documentation incorporating cutting-edge knowledge in this field of study.

GC3. To be able to collect and interpret relevant data on human behaviour, at both individual and social levels and in different contexts, to express reasoned opinions of social, scientific or ethical nature in the psychological field.

GC4. To be able to convey information, ideas, problems and solutions about human behaviour to both general, and specialised, audiences.

Specific competences:

SC1. To know and understand the functioning, characteristics, contributions and limitations of different theoretical models in Psychology.

SC2. To know and understand the basic laws and principles of the different psychological processes.

SC3. To know and understand the processes and main stages of psychological development throughout the life cycle in their aspects of normality and abnormality.

SC4. To know and understand the biological foundations of human behaviour and psychological functions.

Transversal competences:

TC1. To be able to express oneself correctly in Spanish in the professional field.

TC2. To be able to manage information and knowledge in the professional field, including the use of information and communication basic technological tools.

TC3. To understand and express oneself in a foreign language in his/her own disciplinary field, particularly in English.

TC4. To consider ethics and intellectual integrity as essential values of professional practice.

TC6. To have the capacity for teamwork.

3. CONTENTS

The contents of the subject, which will allow students to work on the already mentioned competences, are described on the following chart.

MODULES	UNIT NUMBER	UNIT	HOURS
I. Introduction to Neuroscience	1	Historical evolution of behavioural neuroscience	2
II. Anatomy and basic physiology	2	Microscopic anatomy of nervous system	6
	3	Physiology of nervous system	8
	4	Macroscopic anatomy of autonomous and neuroendocrine system.	4
II. Anatomofunctional bases of the different systems and processes	5	Macroscopic anatomy of the central nervous system.	12
	6	Sensory systems.	8
	7	Motor system.	8
TOTAL			48

4. TEACHING-LEARNING METHODOLOGY. FORMATIVE ACTIVITIES.

4.1. Credit distribution (To specify in hours)

This subject consists of 50 hours of in-person classes (1/3 of the ETCS credits assigned, 100% of class attendance) and 100 hours of independent learning (2/3 of ETCS credits assigned, 0% of class attendance).

Total number of hours (6 ECTS): 150	
Number of hours of classroom attendance 50:	30 hours of whole-group lessons
	15 hours of practical lessons
	3 hours of seminars
	2 hours of assessment tasks
Number of hours of independent learning 100:	100 hours

4.2. Methodological strategies, materials and resources

Teaching-learning methodology:

The **classes**, corresponding to one third of ECTS credits, will be structured throughout the term in three different modalities: theoretical classes, practical classes and seminars.

- ✓ **Theoretical classes.** Different methodologies will be employed. Part of the theoretical contents will be provided and/or explained by the teacher, and others will be sought out and elaborated by the students. When requested by the teacher, students must attend class with the lesson prepared and the content will be commented on, debated or clarified in class. Theoretical self-learning activities are included in this modality.
- ✓ **Practical classes.** These will be done individually or in groups and guided by the teacher. Such activities will include case-studies, problem solving, analysis and discussion of documentary and audio-visual information (articles, videos, scientific documents), as well as the presentation of completed work. In addition, the guidelines for autonomous individual and group work will be provided in practical classes.
- ✓ **Seminars.** Lessons will be held with the participation of students, supervised by the teacher. The seminars will follow the innovative methodology of **dialogic talks**.
- ✓ On the other hand, two thirds of the ECTS credits of the subject will be dedicated to **independent learning**, in order to prepare works and activities destined to be turned in or presented in class, to study, and to prepare for exams. To pass, it is paramount that the student uses this time to achieve the desired learning outcomes.

Materials and resources:

The resources and materials that will be used in this subject will be varied and will align with the different methodologies, modalities and scenarios in which the subject will be given. Students will be provided with the basic material in order to study the different units of the subject in depth, including written, audio-visual and multimedia material. They will have access to the library and computers to carry out research for their work, as well as to the virtual community of the CUCC.

5. ASSESSMENT: assessment criteria, report criteria and assessment procedures

The regulation of the learning assessments of the University of Alcalá, approved in ordinary session of the Board of Directors on 24 March 2011 and modified in ordinary session of the Board of Directors on 5 May 2016, sets the following elements:

- Learning outcomes: are verifiable statements of what a student should know, understand and be able to do after obtaining a specific mark, or after finishing a program or its components.
- Assessment criteria: are the criteria that specify the dimensions and issues that will be assessed in learning.

- Report criteria: distribution of the marks according to the weighting of the assessment criteria, proficiency level or expected outcomes.

The above-mentioned elements for this subject are listed below.

Learning outcomes

The learning outcomes for the subject of Biological Bases of Behaviour set out in the Verification Report of the Degree in Psychology, and relevant to the present subject, are indicated in the following table. It also shows the specific competences to verify each learning outcome.

Specific competence	Related learning outcomes
SC1. To know and understand the functioning, characteristics, contributions and limitations of different theoretical models in Psychology.	<ul style="list-style-type: none"> • The student understands the concept of Psychobiology and knows the different factors that contribute to the explanation of human behaviour. • The student knows the methods and techniques that Psychobiology uses to study behaviour.
SC2. To know and understand the basic laws and principles of the different psychological processes.	<ul style="list-style-type: none"> • The student understands and explains human behaviour by integrating different perspectives.
SC4. To know and understand the biological foundations of human behaviour and psychological functions.	<ul style="list-style-type: none"> • The student understands the biological bases of behaviour and the intervention of nervous and endocrine systems in the main psychological processes. • The student knows the organization of the basic components and structures of the nervous system, as well as their interaction with other systems. • The student understands human behaviour, its development and the compensation possibilities offered by the nervous system thanks to neuroplasticity, present throughout the life cycle, from the perspective of the Psychology of Development. • The student knows the biological bases of the different psychological disorders.

In addition, the appropriate development of **transversal competences** would imply the achievement of the following learning outcomes, which will be assessed transversally by the different assessment instruments mentioned in the table of the section "Report criteria" (namely: theoretical activities, practical classes, seminars and exam).

Transversal competence	Related learning outcomes
To be able to express oneself correctly in Spanish in the professional field.	The student produces oral presentations and written reports using formal style.
To be able to manage information and knowledge in the professional field, including the use of basic information and communication technological tools	<p>The student searches for and uses documentary sources relevant for the discipline.</p> <p>The student analyses and interprets research and publications on the subject.</p> <p>The student argues in terms of scientific thinking, and relates theory and evidence within research in the field of health sciences.</p>
To understand and express oneself in a foreign language in his/her own disciplinary field, particularly in English.	The student is able to understand and analyse texts on the subject in English and use them for his/her works.
To have the capacity for teamwork.	The student cooperates with others and contributes to

	a common project goal. He/she assumes individual responsibility in group work.
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Assessment criteria:

The following assessment criteria are indicators of the Learning Outcomes and will be used to assess the degree of competence development related to this subject:

1. The student defines and conceptually delimits Neuroscience and its place within the area of Psychobiology accurately and using appropriate terminology.
2. The student identifies and spatially locates the basic components and structures of the nervous and endocrine systems.
3. The student answers correctly questions about the anatomical and functional bases of the sensory and motor systems, as well as the functioning of the endocrine system.
4. The student understands the concept of neuroplasticity of the human brain in the context of cognitive and clinical neuroscience, in both healthy individuals and patients with brain damage.
5. The student selects, organises, synthesises and correctly presents information about the main findings in the field of neuroscience.
6. The student selects, analyses, integrates and highlights the most relevant aspects of a set of texts related to brain damage and its consequences at functional level.

The first assessment criterion assesses the development of the specific competence 1, while the others assess the development of the specific competences 2 and 4.

Report criteria:

The following tables explain the assessment criteria with their respective weights and the instruments to be used in the assessment of the subject, for the continuous and final modalities for both ordinary and extraordinary periods.

Continuous assessment. Ordinary and extraordinary assessment periods:

Assessment instruments Assessment criteria of the specific competences	Exam	Practical Classes	Seminars	Theoretical Autonomous activity	%
The student defines and conceptually delimits Neuroscience and its place within the area of Psychobiology accurately and using appropriate terminology.	5%				5%
The student identifies and spatially locates the basic components and structures of the nervous and endocrine systems.	5%			20%	25%
The student answers correctly questions about the anatomical and functional bases of the sensory and motor systems, as well as the functioning of the endocrine system.	30%				30%

The student understands the concept of neuroplasticity of the human brain in the context of cognitive and clinical neuroscience, in both healthy people and patients with brain damage.		15%			15%
The student selects, organises, synthesises and correctly presents information about the main findings in the field of neuroscience.		10%			10%
The student selects, analyses, integrates and highlights the most relevant aspects of a set of texts related to brain damage and its consequences at functional level.			15%		15%
TOTAL	40%	25%	15%	20%	100%

Final assessment. Ordinary assessment period (if requested by the student at the beginning of the term) and extraordinary (if the student fails the continuous assessment modality)

Assessment criteria of the specific competences	Instruments	Exam
The student defines and conceptually delimits Neuroscience and its place within the area of Psychobiology accurately and using appropriate terminology.		5%
The student identifies and spatially locates the basic components and structures of the nervous and endocrine systems.		25%
The student answers correctly questions about the anatomical and functional bases of the sensory and motor systems, as well as the functioning of the endocrine system.		30%
The student understands the concept of neuroplasticity of the human brain in the context of cognitive and clinical neuroscience, in both healthy individuals and patients with brain damage.		15%
The student selects, organises, synthesises and correctly presents information about the main findings in the field of neuroscience.		10%
The student selects, analyses, integrates and highlights the most relevant aspects of a set of texts related to brain damage and its consequences at functional level.		15%
TOTAL		100%

Assessment procedure

The assessment system is based on the regulatory policy of the learning assessment procedure of the University of Alcalá (approved in ordinary session of the Board of Directors on 24 March 2011 and modified in ordinary session of the Board of Directors on 5 May 2016), that states the following rules:

1. This subject has two assessment periods: an ordinary one in May and an extraordinary one in June.
2. **Ordinary assessment period** characteristics:
 - In principle, the ordinary period will employ **continuous assessment**.

The type, characteristics and modality of the instruments and strategies that are part of the assessment process, as well as the weighting between them, should be based on the continuous assessment of the student. *Continuous assessment* is defined as the assessment system, which includes the evaluation of the competence development (acquisition of theoretical and practical knowledge, skills and attitudes) throughout the learning process of the subject. The continuous assessment process uses different strategies and gathers information related to the entire teaching-learning process during the teaching of the subject. This does not exclude the possibility that information could be gathered from the final exam.

- Requirements for continuous assessment:
 - Submittal of the requested activities (at least 80% of proposed activities) by the means specified by the teacher in each case and on the indicated date.
 - When the student does not attend the lesson and/or fails to turn in the requested activity, it should be for a justified reason (illness with doctor's note, accident, serious family problem, etc.). In any case, the justification of non-attendance preserves the student's right to continuous assessment, but it does not mean that the teacher should allow him/her to redo the activity in any way or accept it after the deadline.
 - The different practical classes and the seminars will be assessed as specified by the teacher, including the submittal of documents, oral presentations, or tests to assess the knowledge acquired in these activities.
- If the student does not fulfil these requirements, he/she could not attend the exam and will appear in the report certificate as No-show (according to the section 9.5 of the regulations of the UAH). In this case, the student should attend the extraordinary period.
- **Final assessment** in the ordinary period:
 - If a student cannot commit to continuous assessment in the ordinary period, he/she should formally request the final assessment from the teacher of the subject no later than the second week of lessons. The teacher must indicate if he/she accepts it or not, and submit the request to the *Subdirección de Ordenación Académica del Centro* (sub-direction of academic organisation of the centre) for the final decision. The realization of on-site practices, work and family obligations, health problems and disability could be reasons for requesting the final assessment, but each case will be evaluated individually (section 10.2 of the regulations of the UAH).
 - Students who did not request final evaluation at the beginning of the term, and have not met the criteria for continuous assessment, will not be eligible for this final assessment in the ordinary assessment period (section 10.5 of the regulations of the UAH).

3. **Extraordinary assessment period** characteristics:

- The extraordinary period will only employ **final assessment**. This option is intended for students who:

- Have fulfilled the continuous assessment criteria (submittal of activities and attending practical classes and seminars) but have not taken or have failed the exam in the ordinary period.
 - Have not fulfilled the continuous assessment criteria in the ordinary period because they have not turned in the activities or they have not attended the practical classes and/or seminars in the minimum percentage stipulated.
 - Have requested the final assessment at the beginning of the term, but have not attended the ordinary period.
4. **Regardless of the assessment (continuous or final), to pass the subject, the student must achieve all of its competences by at least 50%, by means of the different assessment tests outlined in this course syllabus.**
5. For more information about the assessment procedures, please see the following document:
<https://www.uah.es/export/shared/es/conoce-la-uah/organizacion-y-gobierno/.galleries/Secretaria-General/Normativa-Evaluacion-Aprendizajes.pdf>

6. BIBLIOGRAPHY

For the contents on neuroanatomical and physiological bases:

Carlson, N.R. (2014). *Fisiología de la Conducta*. Madrid: Pearson.

This is a basic book for any student of Psychology within the field of neuroscience. It exposes the anatomy and physiology of the brain and the functioning of the different sensory and motor systems, sleep, feeding, and many other biological processes. It is highly recommended.

Diamond, M. C.; Scheibel, A. B. y Elson, L. M. (2014). *El cerebro humano. Libro de trabajo*. Barcelona: Ariel.

This book is highly recommended for the student who starts with the anatomy of the nervous system. It presents many schematic drawings of the different structures of the nervous system and allows them to be coloured by means of a chromatic code that greatly facilitates the learning of these structures.

Enríquez de Valenzuela, P. (2014). *Neurociencia Cognitiva*. Madrid: Sanz y Torres.

This text of Cognitive Neuroscience offers a current vision of the main contributions of the discipline to the study of psychological processes in human subjects.

Kandel, E.R.; Schwartz, J.H., Jessell, T.M. (2001, 4ª Ed.) (Eds.). *Principios de Neurociencia*. Madrid: McGraw Hill/Interamericana.

This book exhaustively presents the anatomy and physiology of the central nervous system from a biological perspective, and is not only oriented to medical students, but also to students of Psychology who want to deepen the contents of the subjects of Neuroscience.

Redolar Ripollo, D. (2013) *Neurociencia Cognitiva*. Madrid: Ed. PANAMERICANA

This book presents the contents of cognitive neuroscience from a multidisciplinary perspective by using approaches based on teaching competencies. Special emphasis is given to the understanding

of the different mechanisms and systems of nervous system functioning. It addresses the cognitive processes, reinforcement, sexual behaviour, sleep and consciousness. The work is accompanied by a multitude of pedagogical resources: graphic material to summarize some of the cardinal aspects of the topics developed, highlighted texts in each chapter reinforcing the main text, such as a conceptual summary, key concepts and complementary texts and a website containing different learning resources including videos, complementary content and self-assessment questions.

Another recommended bibliography for this area:

Colmenares Gil, F. (2013) *Bases Biológicas de la Conducta I*. Madrid: Centro de Estudios Financieros.

Del Abril Alonso, A. y cols. (2009) *Fundamentos de psicobiología*. Madrid: Sanz y Torres.

Kalat, J. (2004). *Psicología Biológica*. Madrid: Paraninfo.

Perea, M.V. (2010). *Fundamentos Biológicos de la Conducta: Libro de Trabajo*. Amaru Ediciones.

Pinel, J. (2007). *Biopsicología*. Madrid: Pearson Educación.

Rosenzweig, R.; Breedlove, M.; Watson, N. y Morgado, I. (2005) *Psicobiología: una introducción a la neurociencia conductual, cognitiva y clínica*. Barcelona: Ariel.

For contents related to normal and altered psychological processes:

Junqué, C. y Barroso, J. *Manual de Neuropsicología*. Madrid: Síntesis, 2009.

A complete handbook suitable as introductory text to neuropsychology; it is simple yet technical. Suitable and understandable for undergraduate students.

Kolb, B. Y Whishaw, I.Q. (2006, 5ª Ed.). *Neuropsicología Humana*. Madrid: Médica Panamericana.

This handbook includes an extensive review of anatomy and physiology, as well as cognitive, experimental and clinical psychology. Part I provides the basic information needed for those who start studying the brain. The following parts consider the relationships between brain and behaviour by focusing first on the general organization of the cerebral hemispheres (Part II) and anatomy (Part III), and then on psychological functions (Part IV). Finally, Part V explains the neurological disorders and their rehabilitation.

Lezak, M., Howieson, D.B. y Loring, D.W. (2004) (5th Ed.). *Neuropsychological Assessment*. New York: Oxford University Press.

Comprehensive classic handbook of Neuropsychology that has incorporated advances in neuroimaging and knowledge about the structure and functions of the brain by presenting coloured neuro-radiological images of both healthy and pathological brains in its successive editions. It analyses both classic and modern batteries and tests for neuropsychological assessment. It is the most widely referenced handbook used in neuropsychological evaluation. It is recommended for students interested in this field of knowledge who want to study it in depth and are proficient in English.

Peña-Casanova, J. (2007). *Neurología de la Conducta y Neuropsicología*. Madrid: Médica Panamericana.

Thirty-one professionals from different clinical, university and research fields make updated contributions in neurology of behaviour and neuropsychology: the relationships between the brain and behaviour, cognitive capacities and emotions. The book ranges from biological bases of

behaviour to rehabilitation, including the following the neuropsychological disorders: aphasias, apraxias, agnosias, alexias, agraphias, disorders of the corporal scheme, acalculias, amusias, amnesias, executive function disorders and dementias.

Portellano, J.A. (2005). *Introducción a la Neuropsicología*. Mc Graw Hill.

The book is intended for professionals and students in the healthcare, educational or psychosocial fields interested in brain damage. Neuropsychology, along with other disciplines involved in this pathology, aims to improve the diagnosis, treatment and guidance of brain damage, with the purpose of improving the quality of life of the affected people.

Sacks, O. (2006). *El Hombre que Confundió a su Mujer con un Sombrero*. Barcelona: Anagrama.

Sacks, O. (1995). *Un antropólogo en Marte*. Barcelona: Anagrama.

These two works from Sacks are essential for the student of Neuropsychology, as they bring the student closer to the evaluation and symptomatology of different clinical cases using simple, pleasant and close language. It is compulsory reading for the future psychologist.

Tirapu Ustárriz, J., Ríos Lago, M. y Maestú Unturbe, F. *Manual de Neuropsicología*. Barcelona: Viguera, 2008

This handbook written by three Spanish professionals of Neuropsychology makes a comprehensive review of normal and pathological processes in the different cognitive domains, proposing assessment tests for each one. It is also suitable for undergraduate students.