



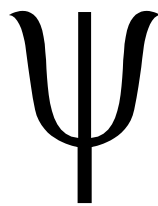
Prifysgol Cymru
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Institute of
EDUCATION
& HUMANITIES

Disgyblaeth Academaidd: Seicoleg a Cwnsela
Academic Discipline: Psychology and Counselling



BSc (Anrh) Seicoleg
BSc (Hons) Psychology

BSc (Anrh) Seicoleg a Cwnsela
BSc (Hons) Psychology and Counselling

Module ECPS5003
The Brain, Biology and Cognition

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Module Handbook

2023-2024

Module ECPS5003
The Brain, Biology and Cognition

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This handbook has been designed to provide you with the necessary information required for your progression throughout the module. It is very important that you refer to this handbook and the associated Moodle site regularly as it is your essential guide to module content and the learning outcomes required to complete the module.

Good luck with your studies. If you have any queries regarding this module, please contact the module leader.

Regards,

Dr Kate Williams

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Introduction to the module

This module will look towards understanding behaviour from both a biological and cognitive standpoint. Whilst some discussion may be specific to one approach only, there will also be considerable overlap. The Biological element will explore the functioning of the brain with particular focus on the anatomy of the nervous system, neural conduction, and synapses. The cognitive element will focus on cognitive applications such as attention and language development. We will also discuss the visual system and perception, memory and learning, research methods in biopsychology and cognitive neuroscience, brain damage, and biopsychological explanations of drug addiction and psychiatric disorders and the consequences of these on cognition. The module is based on empirical studies of human, and in some cases animal, behaviour, and the emerging understanding of the link between cognition, the brain, and behaviour.

There are two core textbooks, which will provide a sound overview of the issues covered in this module. Each lecture comes with essential readings. However, at Level Five you should now be supplementing this reading with extensive reading of more specialist texts and relevant journal articles to gain a more in-depth understanding of the topic. Additionally, the use of alternative textbooks covering a similar depth and breadth as the core texts will not be detrimental to your ability to engage with the module.

CORE TEXTS:

- Pinel, J. P. J. *Biopsychology*. (Also available as E-book through library system).
- Eysenck, M. W., & Keane, M. T. *Cognitive psychology: A student's handbook*. (Also available as E-book through library system).

MODULE CODE: ECPS5003
TITLE: The Brain, Biology and Cognition
LEVEL: 5
CREDITS: 20

AIM(S)

To enable students to critically evaluate core theories and methodologies for studying human cognition, biology, and neuroscience and to enhance students' understanding of the link between cognition, the brain, and behaviour.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe and evaluate key theories of various aspects of human cognition;
- critically discuss the role of the brain and the biological bases of behaviour;
- develop a critical understanding of the methods used to explore the link between the brain and cognition;
- take responsibility for their own learning and skill development; including effective personal planning, self-reflection and project management skills.

INDICATIVE CONTENT

This module will bring together two of the core BPS curriculum topics to deliver a coherent integration of coverage that allows students to develop an understanding of the biopsychological systems and their role in cognitive processes. By combining these topics students will develop an understanding of how the physical structures and functions of the brain influence cognitive processes such as memory, learning, thinking, language, and the methods used to explore these processes.

Specific content coverage mapping onto BPS Core Curriculum for cognitive psychology will include:

- Thinking
- Memory
- Learning
- Language
- Problem-solving
- Cognitive Neuropsychology

Specific content coverage mapping onto BPS Core Curriculum for biological psychology will include:

- Structures and functions of the nervous system
- The influence of drugs
- Neuropsychology and somatosensory perception
- Techniques for studying the brain e.g. neuroimaging
- Biological damage and cognitive deficits

LEARNING AND TEACHING STRATEGY

The module will be delivered through a combination of interactive lectures and seminars, with a focus on further developing students' understanding of the biological and cognitive mechanisms of behaviour through a variety of tasks including practical demonstrations, small class exercises, multimedia packages and group discussions.

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	30	15%
Independent learning	170	85%
Placement learning	-	-
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2,500 words	50%

A 2,500 word written essay that will allow students to display their depth of understanding in a written assignment asking them to critically discuss key module topic areas in relation to cognitive or biological psychology.

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

A two-hour exam will assess students' knowledge of biological and/or cognitive psychology.

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	
TOTAL	100%

This module is a core requirement for Graduate Basis for Chartership (GBC) accreditation with the British Psychological Society (BPS) as set out in documentation to the BPS February 2018.

READING LIST

Module Code	ECPS5003	
Module Title	The Brain, Biology and Cognition	
Classification	Reading List entry	Electronic*
Essential	Eysenck, M. W., & Keane, M. T. (2015). <i>Cognitive psychology: A student's handbook</i> (7th ed.). Hove: Psychology Press.	☒
Essential	Pinel, J. P. J. (2014). <i>Biopsychology</i> (8th ed.) Boston, MA: Pearson.	☒
Further	Braisby, N., & Gellatly, A. (2012). <i>Cognitive psychology</i> (2 nd ed.). Oxford: Oxford University Press.	☐
Further	Dubin, M. W. (2001). <i>How the brain works</i> . Oxford: Blackwell.	☒
Further	Eysenck, M. (2001). <i>Principles of cognitive psychology</i> (2nd ed.). Hove: Psychology Press.	☐
Further	Gross, R. D. (2010). <i>Psychology: The science of mind and behaviour</i> (6th ed.) London: Hodder Education.	☒
Further	Harley, T. (2013). <i>The psychology of language: From data to theory</i> (4th ed.). Hove: Psychology Press.	☐
Further	Mather, G. (2006). <i>Foundations of perception</i> . Hove: Psychology Press.	☐
Further	Smith, E. E., & Kosslyn, S. M. (2007). <i>Cognitive psychology: Mind and brain</i> . Upper Saddle River, NJ: Pearson/Prentice Hall.	☐
Further	<i>Journal of Experimental Psychology (General and Specific)</i>	☒
Further	<i>Cognitive Psychology</i>	☒
Further	<i>Biological Psychology</i>	☒
Further	<i>Neuroscience and Biobehavioral Reviews</i>	☒
Further	<i>Neuropsychology</i>	☒
Further	<i>Brain and Cognition</i>	☒

Module Assessment

The module is assessed through two components, each worth 50% of the overall module mark. The first assessment involves producing a traditional written word essay and the second assessment will be an examination. The examination will consist of a range of questions (short-answer to essay-style), divided into separate sections. Within each section, you will have a set number of questions to answer from a selection of questions and you will choose which of those set number of questions to answer. This format will enable you to display your ability to research specific topics, engage with the course materials, and synthesise information and show your knowledge of the theoretical issues covered in the module.

Whilst it is recognised that you may fall behind at points with your reading, and it is not expected that you will necessarily understand or absorb everything that is covered in lectures and essential readings at the time of coverage, there is an expectation that you will have covered all necessary information by the examination.

In this handbook, you will see a table providing the allocated minimum number of hours you should be dedicating to preparing for the assessments. Although this should provide you with ample time, it emphasises the need to plan and ensure you spend the required time on your assessed work. You only get one opportunity at each assessment to maximise your marks, there are no second tries (unless you fail the module completely!) so give each piece of work the due care and attention that it deserves. We set high standards, we have high expectations – follow the guidance provided and put the effort in that is required and you can do well.

As this is a Level Five module, it is expected that you will now be starting to use empirical evidence to evaluate theories. You should be looking to evaluate the strengths and weaknesses of theories, by using contrasting evidence and arguments. Although you will still be reliant on secondary sources (textbooks), you should now also be using primary sources (journal articles) to provide depth to your arguments. Citing, referencing, writing style and overall presentation are expected to be at exceptionally high standards at Level Five. Proofread carefully, as errors here will result in penalties.

Please see the Assessment Proformas on the module Moodle page for specific information regarding the assessments. For the essay this will include the question, task requirements, and submission deadline. For the exam, this will include information on the structure. For this module, you should complete both pieces of work for assessment, but to pass the module you require a combined mark of 40% or higher.

Level 5 Assessment Criteria

At **Level 5** it is expected that the student will demonstrate the following qualities:

1. More highly developed ability to complete a variety of written tasks effectively, including discursive essay, reports, and case study presentations.
2. Be able to participate orally in a variety of different groups and settings in a confident and articulate fashion.
3. Be able to use language with increasing complexity and sophistication.
4. Be practised in hypothesis formation and knowledgeable about the means for testing hypotheses.
5. Have the capacity to develop a major research interest evolving from the course and to prepare for an involvement with it.
6. Be able to apply a range of theoretical models.
7. Be able to synthesise theories, concepts, and information in relatively novel ways.
8. To have become more practised in critically appraising the competing claims of alternative primary and secondary sources.
9. A growing ability to manage learning in a self-organised manner with a particular view to the importance of achieving desired outcomes within limited time periods.

At Level 5, engagement with suggested literature and course materials, time management, and the development of a strategy for engaging with the topic area form key elements of assessment. Whilst the topics covered in the module may be complex, there are clearly defined expectations regarding assessment that give scope to a Level 5 student. For example, you may be asked to 'discuss' competing theories on a given topic, this allows you to provide an argument drawing upon evidence, and there is an expectation that you are able to interpret and critique the evidence.

Taught and Independent Study

Taught Sessions

The structure of the taught sessions in this module may vary from week to week, depending upon the topics covered, to allow us to explore them in different ways. The following pages set out the broad structure for this module. Sessions will cover some of the major theories and areas of research relevant to the Brain, Biology and Cognition, and then also focus upon specific areas of the sub-topics covered. Throughout the sessions you should be able to display your knowledge of the topics, discuss the issues raised in the readings and experience some of the aspects of Biopsychology and Cognition in a practical manner. This handbook clearly sets out the requirements for your individual learning and it is expected that students will engage in the readings set out in this handbook.

Please note: Sessions will start promptly at their designated time, and we will take short breaks throughout (this must be flexible to fit with content delivery) and a time for the restart will be decided upon at that time.

Late entry will only be permitted at points where the academic staff feel it is appropriate, as it is unfair on students who have arrived on time when their lecture is disrupted by late-attending students. Please note that no materials will be repeated for those arriving late.

This handbook, the weekly planner, and the associated Moodle page should be used to keep track of what we are covering and what the requirements are for module preparation.

Readings

Readings/preparation for this module will largely follow the chapters of your core textbooks and, as such, should be easy to identify. The core texts are available through the Online Resources Link (Leganto) on the module moodle page and through the university library system (both in print copy and as electronic copies online). Therefore, everyone on the course has equal access to these readings.

Expected lecture reading and preparation are set out in advance in the following pages. Readings beyond the core text for this module can be found through the University library system. Where a reading is not widely available (e.g., a book chapter) it will be made available on the module Moodle site. However, journal articles freely available through the University system will not be made available on Moodle – you will have to find them yourself!

Lectures can only provide you with a scaffold of information – it is your wider reading that will help you to develop a comprehensive understanding of the topics and discussions covered in this module. All readings for this module classed as ‘essential’ may be used as a source of assessment. It is suggested that you carry out the essential readings as we go along, as this will enhance your understanding of the overall topic. It is often best to read the associated reading in the week prior to the taught sessions and then again afterwards, as this will enable you to understand what will be covered in the sessions and then to consolidate that knowledge and clarify your learning afterwards. This module has been structured in such a way that the readings and lectures are highly integrated; someone who has prepared by carrying out the reading, attending the lecture and then reviewed the material should develop a good understanding of the material. A student who attends the lecture but does not carry out any of the readings will likely struggle to even understand what is being discussed; they certainly will not develop the knowledge that will be required at more advanced levels of their degree.

Additional reading suggestions will be posted on Moodle from time to time, which will provide further depth to your knowledge, and you are encouraged to engage with as many of these readings as possible.

The module moodle page will also provide set readings, which will allow us to explore the topics in more depth. All additional readings are ‘Essential’ readings in addition to the lecture readings, and attendance at sessions without having prepared appropriately is considered unacceptable and should not occur.

Preparation reading chapters refer to the core texts:

- Book 1: Pinel, J. P. J. *Biopsychology*. Pearson.
 - Available as E-book
- Book 2: Eysenck, M. W., & Keane, M. T. *Cognitive psychology: A student's handbook*. Psychology Press.
 - Available as E-book

Lecture	Book	Suggested Allocated Time
One	Book 1: Chapters 1, 3, & 4 Book 2: Chapter 1	6 hours 2 hours
Two	Book 1: Chapter 9 Book 2: Chapter 11	2 hours 2 hours
Three	Book 1: Chapter 6 Book 2: Chapters 2, 3, & 4	2 hours 6 hours
Four	Book 1: Chapter 7 Book 2: Chapter 5	2 hours 2 hours
Five	Book 1: Chapter 11 Book 2: Chapters 6 & 7	2 hours 4 hours
Six	Book 1: Chapter 10 Book 2: Effects of brain damage discussed in multiple chapters	2 hours 2 hours
Seven	Book 1: Chapter 15 Book 2: Effects of drugs discussed in chapters on memory	2 hours 1 hour
Eight	Book 1: Chapter 18 Book 2: Chapter 8 sections on anxiety/ depression & cognition	2 hours 2 hours
Nine	Book 1: Chapter 5 Book 2: Research methods discussed throughout various chapters	2 hours 2 hours
Ten	Revision Reading	3 hours
Total Core Text Reading		48 hours
Reading of Journal articles on Moodle		10 hours
Total Reading		58 hours

*****Additional Readings from journals will be posted on Moodle *****

Assessment Plan Suggestions

1 x written word essay (**2,500** words) = 50%

1 x **two-hour** Examination = 50%

<i>Suggested plan for written word essay</i>		
Task	What it entails	Time assigned to task
Research essay	Find and read what an essay entails	4 hours
Research topic	Research information for the essay topic area through books and journal articles and make notes	Basic books/journal articles = 15 hours Advanced books/journal articles = 14 hours
Writing first draft	On the computer in Word, start writing your basic arguments	10 hours
Writing second draft	Check coherence of argument and structure of argument flow throughout	6 hours
Writing final draft	Write version to be submitted, complete with citations and full reference list	4 hours
Proofread and check	Proofread for structure and errors, check for presentation + submit to draft Turnitin portal to check for plagiarism.	3 hours
<i>Time allocated to assessment = 56 hours</i>		

<i>Suggested plan for Exam Preparation</i>	
Task and what it entails	Time assigned for task
Revision:- • Review content/slides/material on Moodle • Identify major topics and themes • Read and re-read your notes • Find and read info on the module topics (books & journal articles) • Take notes while you revise • Practice doing mock exam questions	There are 56 hours remaining from your allotted independent study time for the module to devote to revising for the exam. You may feel you need to spend a far greater amount of time than this on revision. Therefore, it is up to you to ensure you have spent the time needed to prepare thoroughly.

Note: These are suggested allocated times and should be used as a guide only. Essentially these are the minimum number of hours you should be spending on each task. You may personally find that you are quicker or slower at certain tasks compared to other tasks. Likewise, you should not stop doing something if the number of suggested allocated hours has come to an end, especially if you still have work or further reading to do.

Lecture Series Information

Lecture One

Anatomy of the nervous system

How the nervous system is structured and communicates through neural and synaptic transmission.

- General layout of the nervous system
- Autonomic nervous system
- Neuroanatomical Techniques and Directions
- Structures and divisions in the brain
- Anatomy of Neurons
- Neural conduction and synaptic transmission
- Resting membrane potential
- Generation and conduction of postsynaptic potentials
- Integration of postsynaptic potentials and generation of action potentials
- Conduction of action potentials
- Synaptic transmission
- Neurotransmitters

Recap of Cognitive Psychology

We will also briefly recap the foundations in the study of cognition, and how these relate to modern paradigms in research linking to biological psychology.

- What is Cognitive Psychology
- Representations
- The main approaches in Cognitive Psychology
- Links to biological psychology
- Emotion and Cognition

Lecture Two

Neurodevelopment and Language development

We will focus on the development of the nervous system and the key phases involved. We will explore disorders of neurodevelopment such as autism and Williams syndrome. We will also discuss language development and the key phases involved.

- Development of the nervous system
- Phases of neurodevelopment
- Effects of early experience
- Neuroplasticity
- Disorders of neurodevelopment
- Language development

Human and animal communication

The ability to communicate through a human linguistic system will also be discussed. This includes specific aspects theorised to compose human language, as well as the study of animal communication.

- Studies of animal communication
- Complex and simple animal communication
- Theoretical elements of human language
- Comparison between animal and human elements
- Semanticity, displacement, structure and creativity
- The power of recursion in human language

Lecture Three

Vision and Perception

We will focus on the structure of the eye and vision, and how our brain interprets signals sent from our eyes. We will examine how we perceive information from the environment. We will also briefly examine disorders of the visual system.

- Structure of the eye
- The translation of light into neural signals
- From the retina to the primary visual cortex
- Seeing edges and colour
- Cortical mechanisms of vision
- Perception
- Visual and perceptual deficits

Functional Visual Specialisation and perceptual processing

We will also explore a key topic within the area of vision and perception, and that relates to the question of how separate processing in the brain of distinct visual elements are combined to provide us with the perception of a coherent whole. Along with the exploration of this key area, we will also discuss the mechanisms of top-down vs. bottom-up processing

- The binding problem
- Visual illusions
- Evidence from brain damaged patients

Lecture Four

Mechanisms of hearing, touch, and attention

We will build upon the previous sessions on the visual system to examine the auditory and somatosensory systems. We will then focus upon mechanisms of attention, face and object recognition, and related theories that attempt to explain how we interpret/make sense of and understand the information we receive from our senses.

- Principles of sensory system organisation
- The auditory system
- The somatosensory system
- The experience of pain
- Attention
- Object and face recognition
- Theoretical frameworks

Lecture Five

Learning, memory, and amnesia

The more permanent storage of information and knowledge is necessary for much of what we describe as human life and abilities. To facilitate this, we require a system of memory that can represent, store, and retrieve information at an accurate level. Research and theory suggest that we use different memory systems within the whole that we call long-term memory. However, although we may hope that our memories function in a perfectly accurate way, and reproduce information exactly as it was first experienced, evidence suggests this is often not the case. Therefore, we will focus on understanding the structure of our long-term memory, explore some important effects on how accurately our memories perform, the location of memory processing and storage in the brain and synaptic mechanisms of learning. We will then examine amnesia and the research into dissociations of memory stores.

- Processes of encoding, storage, representation, and retrieval
- Episodic, semantic, and procedural memory systems
- Depth of processing effects
- Schema
- Consolidation and Reconsolidation
- Recall and recognition in comparison
- Forgetting from long-term memory
- The role of the hippocampus
- Where are memories processed and stored in the brain?
- Amnesia

Lecture Six

Biological and Cognitive effects of Brain damage

We will examine how different types of brain damage can physically affect the functioning of the nervous system, and the subsequent effects on cognition. We will also examine cell death, neuropsychological diseases, & neuroplasticity.

- Causes of brain damage
- Neuropsychological disease
- Animal models
- Neuroplasticity
- Brain damage and cognition

Epilepsy

Although the focus will be on a range of neuropsychological diseases, our session discussions will specifically focus on epilepsy. We will discuss the causes, types, characteristics, methods of diagnosis, and methods of treatment.

Lecture Seven

Biological and Cognitive effects of Drug addiction

We will examine the effects of drugs upon the nervous system and specifically how these compounds may affect the brain's reward centres. We will explore the psychological, physiological, and contextual aspects of drug addiction and potential treatment efficacies.

- Basic principles of drug action
- Role of learning in drug tolerance
- Types of commonly abused drugs
- Bio-psychological approaches to theories of addiction
- Intracranial self-stimulation and pleasure centres of the brain
- Pharmacology of synaptic transmission
- The role of dopamine

We will also discuss the effects of drugs on cognition and performance on cognitive tasks.

Lecture Eight

Psychiatric disorders

We will examine the bio-psychological basis for common clinical psychiatric disorders. We will focus upon schizophrenia, the affective disorders of mania and depression, and anxiety disorders. We will discuss the causes, consequences, and brain pathology associated with these disorders, and discuss the efficacy of pharmacological and psychological treatments. We will also build on from your Level Four Cognition and Emotion module to further examine how affective disorders can influence, and be influenced by judgements, decisions, attention, and memory, and their link to cognitive biases.

- Schizophrenia
- Mania
- Depression
- Anxiety disorder
- Brain pathology
- Cognitive biases

Dopamine theory of schizophrenia

Our group discussion will specifically focus on the development of the dopamine theory of schizophrenia and the subsequent research evidence that has led to the amending and updating of this theory over the years to better understand the biopsychology of the condition.

Anxiety and Affective Disorder

Our groups discussions will focus on the aetiology, causes, symptoms, treatments of anxiety and affective disorders.

Lecture Nine

Research methods of Biopsychology and Cognitive Neuroscience

This week will focus on examining the research methods that are utilised in contemporary biological and cognitive neuroscience research. These include methods for visualising the brain to understand its structure and function, recording psychophysiological activity, invasive methods, pharmacological research, neuropsychological testing, and animal paradigms. We will also run through a practical demonstration of using Galvanic Skin Response to measure physiological arousal.

Methods of studying the nervous system

- Visualising and stimulating the human brain
- Recording psychophysiological activity
- Invasive physiological methods
- Pharmacological methods
- Genetic engineering

Behavioural research methods

- Neuropsychological testing
- Cognitive neuroscience
- Biopsychological paradigms of animal behaviour

Lecture Ten

Module Summary and Exam Preparation

For the final week of the module, we will use the designated time to run through specific guidance for the exam and to run through the specific areas to focus your revision on preparation for the exam. We will end with some information to prepare you for the exam in general terms and you will have the opportunity to ask any questions about the module or discuss any elements of uncertainty.

******End of Module Series Information******