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| Course Title | Brain and Behaviour | | | |
| Course Code | MED-301 | | | |
| Course Type | Required | | | |
| Level | Undergraduate | | | |
| Year / Semester | Year 3/ Semester 5 (Fall) | | | |
| Teacher's Name | Course Lead: Dr Stelios Georgiades Contributor: Prof Savvas Papacostas Dr Achilleas Pavlou Dr Yiolanda Christou | | | |
| ECTS | 6 | Lectures / week | 5 | Laboratories / week 0 |
| Course Purpose and Objectives | <p>The overarching theme of the Brain and Behaviour course is that nervous system disorders can be understood in terms of neuroanatomical, physiological and psychological mechanisms to the extent this is possible given current knowledge.</p> <p>The course objectives are:</p> <ul style="list-style-type: none"> • To understand how the nervous system functions as a whole. • To provide a sound scientific basis for the understanding of the disorders of the nervous system. • To gain an extended focus on higher cognitive functions, behaviour and mental health. • To understand the role of psychological factors in the development of mental illness. • To explore the relationship between mental illness and psycho-neurological factors. <p>Individual topics include organization, function and dysfunction (e.g., lesion effects) of spinal cord, brainstem, cerebral cortex, and subcortical regions. Also included are the role of family and other environmental factors in the psychological wellbeing of individuals and their contribution to the development of behavioural difficulties and problems.</p> <p>Clinical topics include Parkinson's disease, Huntington's disease, cerebellar disorders, Alzheimer's disease, multiple sclerosis, epilepsy, schizophrenia, depression, anxiety and personality disorders.</p> | | | |
| Learning Outcomes | The following list provides the learning objectives that will be covered in the lectures, and tutorials of each week: | | | |

Week 1

Lobs covered during lectures (Psychology):

1. Outline the institution of marriage.
2. Describe causes and rates of divorce.
3. Outline the link between Physical and Psychological Health.
4. Describe the concept of normality and abnormality in human development both from a physical and a psychological perspective.

Lobs covered during lectures (Neurology):

5. Review the basic anatomy of the Nervous System and its divisions and subdivisions.
6. Describe the Central Nervous System and Peripheral Nervous System components including Central Nervous System: Brain and Spinal Cord, brain stem anatomy (cranial nerves and nuclei, reticular formation, blood supply), hypothalamic function, limbic system and emotional behaviour; Peripheral Nervous System: Somatic and Autonomic Nervous Systems, Autonomic Nervous System: Sympathetic and Parasympathetic Nervous Systems.
7. Describe the gross anatomy and blood supply of the brain and spinal cord.
8. Describe spinal reflexes.
9. Describe the basic cell/tissue structure and function of neurons.
10. Describe the role of the neurological exam.
11. Demonstrate the ability to systematically perform the neurological exam with emphasis on a working hypothesis derived from the history.
12. Describe the elements of the neurological exam, namely the orderly examination of the mental status, the cranial nerves, the motor exam, coordination, sensation, reflexes and gait and explain what any abnormal findings represent.

Week 2

Lobs covered during lectures (Psychology):

13. Outline the role of sexuality in human cycle.
14. Outline the most important sexual dysfunctions.
15. Outline the most important sexual deviations.
16. Describe the origins of HIV/AIDS.
17. Epidemiological Studies.
18. Psychological Impact on HIV/AIDS.

Lobs covered during lectures (Neurology):

19. Describe the usefulness and utility of the following diagnostic tests: Electroencephalography, Nerve Conduction Studies, Electromyography,

Evoked Potentials, Computed tomography, Magnetic Resonance Imaging, Vascular imaging, Positron Emission Tomography.

20. Describe the tests that should be carried out depending on the patient's condition and working diagnosis.
21. Describe the basic techniques used in the performance of the following diagnostic tests: Electroencephalography, Nerve Conduction Studies, Electromyography, Evoked Potentials, Computed tomography, Magnetic Resonance Imaging, Vascular imaging, Positron Emission Tomography.
22. Describe the underlying anatomy/physiology involved in the application of the following diagnostic tests: Electroencephalography, Nerve Conduction Studies, Electromyography, Evoked Potentials, Computed tomography, Magnetic Resonance Imaging, Vascular imaging, Positron Emission Tomography.
23. Define coma and discuss its causes.
24. Describe the processes that will have to take place to localize the site of dysfunction in a patient.
25. Outline the function of the Glasgow Coma Scale.
26. Describe the checking of brainstem reflexes, posturing, reflexes and formulate a differential diagnosis.
27. Describe further laboratory investigations that can be used to evaluate coma.
28. Differentiate coma, persistent vegetative state, locked-in-syndrome, brain death.
29. Describe treatment options that should be used for comatose patients.
30. Describe the basic anatomy of the visual pathways.
31. Localize the site of dysfunction through appropriate examination.
32. Differentiate between monocular and binocular visual loss.
33. Identify the cause of Horner syndrome and other pupillary lesions (Adie's and Argyll Robertson pupils).
34. Identify optic disc abnormalities (papilloedema, drusen, optic neuritis, ischaemia) and discuss possible causes.
35. Outline the anatomy of eye movements and their abnormalities (diplopia, supranuclear palsies, nystagmus).

Week 3

Lobs covered during lectures (Psychology):

36. Outline the role of sleep.
37. Outline the different stages of sleep.
38. Describe the impact of total and selective sleep deprivation.
39. Outline the most common sleep disorders.
40. Describe the symptoms associated with the most common sleep disorders.

41. Outline the available treatments on sleep disorders.

Lobs covered during lectures (Neurology):

42. Outline the anatomy of major motor system pathways.

43. Explain how weakness can be caused by lesions along the entire neuraxis.

44. Identify the site of the lesion following appropriate examination (muscle, neuromuscular junction, peripheral nerve, nerve root, plexopathies, spinal cord, brainstem, cerebral hemispheres).

45. Differentiate brain and spinal cord (upper motor neuron) from lower motor neuron lesions.

46. Describe the use of appropriate tests (NCS/EMG, Imaging) for confirmation of the working diagnosis.

47. Describe the anatomy of various sensory systems and pathways.

48. Describe how sensory dysfunction can be caused by lesions along the entire neuraxis.

49. Discuss general sensory modalities, including sharp, dull, temperature, vibratory, and proprioception.

50. Describe the pathway of a signal from the periphery to the brain according to its modality.

51. Outline basic dermatomal distributions.

52. Explain special sensory modalities, including vision, hearing, taste, olfaction, and balance.

53. Demonstrate ability in examining the sensory system.

54. Localize anatomic site of lesions according to the examination.

55. Define terms such as paresthesia, dysesthesia, hyperesthesia, allodynia and dissociated sensory loss.

56. Discuss pain syndromes such as RSD and Fibromyalgia.

57. Describe the various types of vertigo their pathophysiology and treatment.

58. Describe the association and implications of tinnitus, diplopia, dysarthria and other signs of brainstem dysfunction to vertigo.

59. Describe diagnostic and treatment manoeuvres for vertigo.

60. Define syncope and presyncope and explain their pathophysiology.

61. Describe the relationship of syncope to neurogenic syncope, autonomic failure and orthostatic hypotension.

Week 4

Lobs covered during lectures (Psychology):

62. Describe what is Psychopathology.

63. Outline the methods employed in the diagnosis of psychological and psychiatric disorders.
64. Outline the treatments often used in the treatment of psychiatric and psychological disorders.
65. Outline the most common adult psychiatric disorders.
66. Describe anxiety disorders.
67. Describe the diagnosis of anxiety disorders.
68. Describe the prevalence and aetiology of anxiety disorders.
69. Describe the treatment approaches of anxiety disorders.

Lobs covered during lectures (Neurology):

70. Outline the anatomy of the cerebellum and its connections to other brain regions.
71. Describe the signs and symptoms of cerebellar disease.
72. Describe and identify cerebellar haemorrhage and infarction, alcoholic cerebellar degeneration, infectious cerebellitis, and paraneoplastic degeneration.
73. Discuss the various ataxias including Friedreich ataxia, Genetic ataxias and Miller Fisher syndrome.
74. Identify major gait disorders namely hemiparetic, akinetic rigid, frontal, waddling, proprioceptive and psychogenic.

Week 5

Lobs covered during lectures (Psychology):

75. Describe the diagnosis of depression disorders.
76. Describe the prevalence and aetiology of depression.
77. Describe the treatment approaches of depression.
78. Causes and interventions on Suicidal Ideation

Lobs covered during lectures (Neurology):

79. Outline the anatomy and physiology of bladder incontinence.
80. Describe diagnostic tests in the evaluation of bladder dysfunction.
81. Differentiate between spastic and atonic bladder.
82. Describe the types of incontinence (urge, stress, mixed, overflow), their occurrence in neurologic disease, and their treatment.
83. Outline the basic causes, pathophysiology and treatment of erectile dysfunction.
84. Define dementia and delirium and discuss their differences and similarities and how they affect higher functions: cognition, language, memory, executive function.

85. Discuss the main causes of dementia and delirium and the approach to diagnosis and treatment.
86. Discuss common types of dementia (Alzheimer disease; frontotemporal dementia, including Pick disease, progressive supranuclear palsy, Lewy body Disease, vascular, Huntington and Parkinson dementia and metabolic dementias).
87. Discuss infections causing dementia (Creutzfeldt-Jakob and HIV).
88. Demonstrate proficiency in obtaining a history and examining a headache in a patient especially in identifying important signs such as meningismus, papilloedema, eye movement abnormalities and visual dysfunction.
89. Differentiate between the primary headache disorders (migraine, tension-type, cluster etc.) and discuss their treatment.
90. Differentiate between the secondary headache disorders (subarachnoid, low-pressure, idiopathic intracranial hypertension, temporal arteritis, chronic daily headaches) and discuss their treatment.
91. Discuss the diagnostic approach and treatment of facial pain syndromes.

Week 6

Lobs covered during lectures (Psychology):

92. Describe Psychosis.
93. Describe the diagnosis of Psychosis.
94. Describe the prevalence and aetiology of Psychosis.
95. Describe the treatment approaches of Psychosis.

Week 7

Lobs covered during lectures (Psychology):

96. Outline the different types of substances often abused.
97. Describe the impact that different substances have on human behaviour.
98. Outline the types of treatments offered to people suffering from substance addictions.
99. Clinical Assessment on Alcohol Abuse.

Lobs covered during lectures (Neurology):

100. Describe the role of the basal ganglia on motor function.
101. Describe how movement disorders can be hypo- or hyper-kinetic.

102. Differentiate between idiopathic Parkinson's disease and other Parkinsonian syndromes (PSP, CBGD, Vascular, MSA) with respect to pathophysiology, clinical diagnosis and treatment.
103. Describe the basic pharmacologic and surgical therapy for Idiopathic Parkinson's Disease (IPD).
104. Differentiate different types of tremor (resting, action, postural etc.).
105. Describe conditions such as dystonia, adult tic disease, essential tremor, Huntington, stiff person syndrome, chorea, ballism, myoclonus, Wilson disease, and paroxysmal dyskinesias.
106. Outline the different types of aphasia (Wernicke's, Broca's, transcortical etc.) and describe their anatomic distribution.
107. Describe the approach to evaluating aspects of language problems (fluency, repetition, comprehension, naming, reading, writing).
108. Explain the concepts of apraxia, agnosia and neglect, localize them anatomically and provide examples of each.
109. Describe non-dominant hemisphere syndromes.
110. Describe the pathophysiology of seizure disorders, and define epilepsy.
111. Outline the classification of seizures including generalized (tonic-clonic, absence, tonic, clonic, atonic), partial (simple and complex) and febrile seizures.
112. Describe the epidemiology and etiologies of seizures.
113. Describe the basic drugs used for different seizure types as well as other therapeutic options (diet, surgery, neurostimulation).
114. Describe the approach to a patient with epilepsy for clinical diagnosis and further testing (EEG, imaging etc.).
115. Outline how to approach and treat status epilepticus and give first aid in a seizure.
116. Discuss selected epilepsy syndromes (Lennox-Gastaut, Rolandic, Juvenile myoclonic).
117. Differentiate seizures from other paroxysmal events.
118. Outline special issues such as driving and epilepsy, pregnancy in women with epilepsy and psychogenic seizures.

Formative Midterm Exam

Week 8

Lobs covered during lectures (Psychology):

119. Define personality disorders and outline the main features of common personality disorders.
120. Explain their interaction with other psychiatric disorders, and how co-morbidity can impact on progress and outcome.

121. Describe therapeutic approaches used in treatment of severe personality disorders.
122. Outline the most common childhood psychiatric disorders.
123. Outline the epidemiology, the method of assessment, diagnosis and treatment of childhood anxiety disorders.
124. Outline the epidemiology, the method of assessment, diagnosis and treatment of childhood affective disorders.
125. Outline the epidemiology, the method of assessment, diagnosis and treatment of ADHD.

Lobs covered during lectures (Neurology):

126. Outline brain gross anatomy and blood supply including abnormalities such as arteriovenous malformations, ectopic cerebral vessels, cerebral artery aneurysm, carotid artery stenosis/atherosclerosis/occlusion/dissection, vertebral artery insufficiency/dissection, subclavian steal syndrome, venous sinus thrombosis.
127. Discuss the corresponding symptoms from vascular supply.
128. Describe the approach to transient ischaemic attack.
129. Describe the different types of thrombotic stroke: cerebral artery occlusion/cerebral infarction/lacunar stroke.
130. Describe the different types of embolic stroke: cerebral embolism; intracerebral haemorrhage, including subarachnoid haemorrhage, traumatic intracranial haemorrhage; hypertensive encephalopathy; posterior reversible encephalopathy syndrome.
131. Recognize cardinal features of metabolic encephalopathies (fluctuating arousal, asterixis) and explain possible mechanisms.
132. Describe systemic illnesses that affect the Nervous System.
133. Outline common metabolic disorders affecting the Nervous System, specifically sarcoidosis, diabetes, lupus, antiphospholipid antibody syndrome and thyroid disease.
134. Describe the multiple effects of alcohol and nutritional deficiency on the Nervous System.
135. Explain the implications of space-occupying lesions in the cranial and spinal areas.
136. Discuss the different types of nervous system tumours, their common presenting features (headache, seizures, etc.) and their approach to investigation and therapy.

Week 9

Lobs covered during lectures (Psychology):

137. Outline brain hemispheric asymmetry and hemispheric dominance.
138. Outline the role of neuropsychological testing.

139. Describe the different types of neuropsychological tests used for assessing the functioning of different cortical areas.
140. Outline the role of testing in Neuropsychiatry and Neurorehabilitation.
141. Clinical Applications of Neuropsychological Assessment.

Lobs covered during lectures (Neurology):

142. Describe the differences between epidural and subdural haematoma (cerebral and spinal).
143. Outline the implications of intraparenchymal haemorrhage, traumatic subarachnoid haemorrhage, cerebral oedema.
144. Explain the concept of traumatic brain injury (concussion)/post-concussion syndrome, traumatic brain syndrome and diffuse axonal injury.
145. Differentiate between various traumatic herniation syndromes (central, uncal, subfalcine).
146. Demonstrate competency in the initial approach and evaluation and treatment of head trauma including management of raised intracranial pressure.
147. Demonstrate proficiency using the Glasgow coma scale.
148. Recognize and describe treatment of brain infective agents causing bacterial meningitis/encephalitis.
149. Recognize and describe treatment of brain infective agents causing viral meningitis/encephalitis.
150. Recognize and describe treatment of brain infective agents causing fungal meningitis/encephalitis.
151. Describe spirochaetal infections including *Borrelia burgdorferi*, *Leptospira*, *Treponema pallidum* and their treatment.
152. Outline protozoal/helminthic infections of the nervous system.
153. Describe prion disease including Creutzfeldt-Jakob Disease.
154. Describe botulism (*Clostridium botulinum*), tetanus (*Clostridium tetani*) and their treatment.
155. Describe CNS disorders associated with AIDS (e.g. progressive multifocal leukoencephalopathy).
156. Describe the epidemiology and common presentations of Multiple Sclerosis (MS).
157. Discuss possible clinical courses and prognosis of MS (benign, relapsing-remitting, primary progressive, secondary progressive).
158. Discuss the evaluation and treatment options of MS.
159. Describe acute disseminated encephalomyelitis.
160. Describe the relationship between neuromyelitis optica and MS.
161. Describe leukoencephalopathies (PML, PRES, Central pontine myelinolysis).

162. Describe adrenoleukodystrophy.

Week 10

Lobs covered during lectures (Psychology):

163. Outline the origins of Psychoanalytic theory.

164. Outline the main characteristics of the Psychoanalytic Theory.

165. Outline the advantages and disadvantages of this theory in the treatment of Psychological and Psychiatric disorders.

166. Outline the origins of Behavioural Therapy.

167. Outline the main characteristics of the Behavioural Therapy.

168. Describe the different techniques employed in the Behavioural Therapy Approach.

169. Outline the advantages and disadvantages of this approach in the treatment of Psychological and Psychiatric disorders.

Lobs covered during lectures (Neurology):

170. Review CNS anatomy and function.

171. Recognize common cranial nerve lesions/dysfunction: Optic neuropathy; causes, treatment, prognosis and Oculomotor nerve palsy; causes, treatment, prognosis.

172. Review the anatomy of the cavernous sinus and nerves passing through.

173. Describe the findings in Bell's palsy.

174. Outline and describe treatment of Ramsey-Hunt syndrome, vestibulocochlear lesions and dysfunction, glossopharyngeal neuralgia, accessory and hypoglossal nerve palsies.

175. Review spinal cord anatomy and vasculature.

176. Explain anterior spinal artery syndrome.

177. Localize site of lesion/dysfunction in the spinal cord and utilize appropriate diagnostic tests.

178. Describe spinal cord syndromes and emergencies (transection, compression, hemicord syndromes, central cord lesions, cauda equine/conus lesions).

179. Describe congenital disorders and spinal stenosis (cervical/lumbar).

180. Diagnose, evaluate and treat Amyotrophic Lateral Sclerosis (ALS).

181. Recognize, classify and differentiate between radiculopathy, mononeuropathy (including mononeuropathy multiplex) and polyneuropathy.

182. Describe how to systematically approach peripheral nerve lesions/dysfunction.

183. Describe rational diagnostic evaluation.

184. Recognize, evaluate and treat immune-mediated neuropathies (Guillain-Barre, CIDP, MMN, M-protein associated).
185. Recognize, evaluate and treat metabolic, autonomic and infectious neuropathies.

Week 11

Lobs covered during lectures (Psychology):

186. Outline the origins of Cognitive Behavioural Therapy.
187. Outline the main characteristics of the Cognitive Behavioural Therapy.
188. Describe the different techniques employed in the Cognitive Behavioural Therapy Approach.
189. Outline the advantages and disadvantages of the Cognitive Behavioural Therapy Approach in the treatment of Psychological and Psychiatric disorders.
190. Clinical Applications of CBT.

Lobs covered during lectures (Neurology):

191. Describe the pathophysiology and presentation of myasthenic syndromes and describe treatment options.
192. Classify intrinsic muscle disorders such as the dystrophinopathies, muscular dystrophies and describe treatment options.
193. Explain the utility of various diagnostic tests available for the diagnosis of neuromuscular disorders.
194. Outline mitochondrial, inflammatory, systemically-induced and toxic myopathies and describe treatment options.
195. Describe neural tube defects (spina bifida, holoprosencephaly, anencephaly).
196. Explain microcephaly.
197. Describe Sturge-Weber syndrome, tuberous sclerosis, von Hippel-Lindau disease.
198. Describe the dynamics of hydrocephalus (including normal pressure) and other obstructive conditions (Arnold-Chiari, pseudotumour cerebri/idiopathic intracranial hypertension).
199. Discuss drug-induced dementia
200. Describe acute dystonic reaction and its culprits.
201. Discuss drug-induced meningitis and its causes (e.g., NSAIDs, sulfa drugs).
202. Discuss drug-induced neuropathies and their treatment (e.g., vincristine, isoniazid, metronidazole).
203. Recognize extrapyramidal adverse effects and their culprits (e.g., akathisia, dystonia, drug-induced parkinsonism, tardive dyskinesia).
204. Describe neuroleptic malignant syndrome.

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| | <p>205. Describe poisoning by psychotropic agents, such as the antidepressants including the serotonin syndrome.</p> <p>Week 12</p> <p>Lobs covered during lectures (Psychology):</p> <p>206. Applications of psychological theories to medical practice.</p> <p>Lobs covered during lectures (Neurology):</p> <p>207. Explain the significance of non-organic symptom mimics in clinical neurology.</p> <p>208. Describe voluntary vs involuntary symptoms and the issue of secondary gain.</p> <p>209. Recognize underlying psychiatric disease in selected cases.</p> <p>210. Describe the process of making appropriate referrals to mental health specialists.</p> <p>211. Describe major presentations of functional/somatoform disorders (conversion, somatization, pain, hypochondriasis, malingering, factitious) and formulate a therapeutic plan.</p> <p>212. Recognize the need for a special approach to diagnosing paediatric neurology conditions.</p> <p>213. Describe the basic developmental milestones of children.</p> <p>214. Describe major neurological conditions in children such as MR/DD, Autism, Regression and Neurodegeneration, ADHD, and be able to suggest initial evaluation and recommend treatment.</p> | | |
| Prerequisites | None | Required | None. |
| Course Content | <p>Psychology</p> <ul style="list-style-type: none"> • Family, Psychological Adjustment and Physical Health • Sexuality • HIV/AIDS • The Functions of Sleep • Introduction to Psychopathology • Anxiety Disorders • Depression • Psychosis • Personality Disorders • Drug and Alcohol Abuse • Child Psychopathology • Neuropsychological Assessment • Psychoanalysis | | |

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| | <ul style="list-style-type: none"> • Learning and Behaviourism • Cognitive Behavioural Therapy <p>Neurology</p> <ul style="list-style-type: none"> • Anatomy and physiology of the nervous system • The neurologic examination • Neurologic diagnostic procedures and cerebrospinal fluid haemodynamics • Coma and other altered states of consciousness • Neuro-ophthalmology • Weakness • Sensory system and sensory dysfunction • Dizziness, Vertigo, Syncope • Ataxia and gait disorders • Urinary and sexual dysfunction • Language dysfunction and other disorders of higher cortical function • Dementia and delirium • Cephalgia and facial pain • Seizures and Epilepsy • Movement disorders • Cerebrovascular disease • Systemic and Metabolic Disorders • Tumours • Head Trauma • Infections • Demyelinating Disorders • Cranial nerve injury • Disorders of the spinal cord • Peripheral nerve injury/ disorders and plexopathies • Disorders of Neuromuscular junction and skeletal muscle • Congenital, traumatic and mechanical disorders • Adverse effects of drugs on the Nervous System • Somatoform disorders • Paediatric Neurology |
| Teaching Methodology | Lectures, Tutorials and Workshops. |
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|------------------------|---|---|---|---------------|---------------|
| Bibliography | Required Textbooks/Reading: | | | | |
| | Authors | Title | Publisher | Year | ISBN |
| | Pomerantz M. Andrew | Clinical Psychology: Science, Practice and Culture | Sage Publications 4 th Edition | 2017 | 9781506333748 |
| | Drislane, Frank W. | Blueprints Neurology | Lippincott Williams and Wilkins 5 th Revised Edition | 2019 | 9781496387394 |
| | Recommended Textbooks/Reading: | | | | |
| | Authors | Title | Publisher | Year | ISBN |
| Kaplan | Step 1 Lecture Notes 2019 in Behavioral Sciences | Kaplan | 2022 | 9781506272962 | |
| | Diagnostic and Statistical Manual of Mental Disorders | American Psychiatric Association 5th Edition (DSM5) | 2013 | 9780890425541 | |
| Aminoff, Michael J. | Clinical Neurology | McGraw Hill/Lange 11th Edition | 2020 | 9781260458350 | |
| Assessment | On-line Formative Midterm Exam and Summative Final Exam. The Summative Final Exam will contribute towards 100% of the course grade. Assessment is by Single Best Answer MCQs (SBAs) and there may also be some Short Answer Questions (SAQs). | | | | |
| Language | English | | | | |