Washtenaw Community College Comprehensive Report

PSY 296 Neuropsychology of Addiction
Effective Term: Winter 2019

Course Cover

Division: Humanities, Social and Behavioral Sciences
Department: Behavioral Sciences
Discipline: Psychology
Course Number: 296
Org Number: 11200
Full Course Title: Neuropsychology of Addiction
Transcript Title: Neuropsychology of Addiction
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Course Change
Change Information:
Consultation with all departments affected by this course is required.
Course description
Pre-requisite, co-requisite, or enrollment restrictions
Outcomes/Assessment
Objectives/Evaluation
Rationale: We have made some modifications to this course over the past couple of years and this year, we have made an online section which required significant changes to the course. I am primarily updating the master syllabus at this point.
Proposed Start Semester: Winter 2019
Course Description: In this course, students will study the basic principles of pharmacology, including both pharmacokinetics and pharmacodynamics and the application of these principles to addictive drugs. In particular, students will focus on the functioning of the nervous system with an emphasis on neurotransmission, the evolution of our understanding of the biological mechanisms of addiction, and various physiological effects, including the mechanism of action of both legal and illegal psychoactive drugs.

Course Credit Hours

Variable hours: No
Credits: 3
Lecture Hours: Instructor: 45 **Student:** 45
Lab: Instructor: 0 **Student:** 0
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 45 **Student:** 45
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

No Level Required

Requisites

Level II Prerequisite

Both Psychology 100 and Biology 101 or Biology 102 are STRONGLY RECOMMENDED.

General Education

General Education Area 5 - Social and Behavioral Science

Assoc in Applied Sci - Area 5
Assoc in Science - Area 5
Assoc in Arts - Area 5

Michigan Transfer Agreement - MTA

MTA Social Science

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Identify the key components of the nervous system with an emphasis on the parts of the brain that are responsible for the physiological, emotional, and cognitive effects of psychoactive drugs.
   Assessment 1
   Assessment Tool: Essay exam
   Assessment Date: Fall 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students enrolled
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 80% of students must score 70% or higher
   Who will score and analyze the data: Departmental faculty

2. Recognize the structure and function of neurons and glial cells, with an emphasis on communication within the nervous system, neurotransmission.
   Assessment 1
   Assessment Tool: Multiple-choice test questions
   Assessment Date: Fall 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students enrolled
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 80% of students must score 70% or higher on the outcome-related questions
   Who will score and analyze the data: Departmental faculty

3. Describe the basic principles of pharmacology, focusing on (a) pharmacokinetics, how drugs move through the body, and (b) pharmacodynamics, how drugs cause biological changes in the body.
   Assessment 1
   Assessment Tool: Essay exam
   Assessment Date: Fall 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students enrolled

How the assessment will be scored: Departmentally-developed rubric
Standard of success to be used for this assessment: 80% of students must score 70% or higher
Who will score and analyze the data: Departmental faculty

4. Identify the neurophysiology (i.e. mechanism of action) for both legal and illegal (nicotine and alcohol, stimulants, opioids, and cannabinoids) psychoactive drugs.
   Assessment 1
   Assessment Tool: Mechanism of action review sheet
   Assessment Date: Fall 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 80% of the students must score 70% or higher
   Who will score and analyze the data: Departmental faculty

5. Identify the major biological and psychological explanations for drug addiction.
   Assessment 1
   Assessment Tool: Multiple-choice test questions
   Assessment Date: Fall 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students enrolled
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 80% of students must score 70% or higher on the outcome-related questions
   Who will score and analyze the data: Departmental faculty

6. Recognize the definition, etiology, and treatment for anxiety and depression disorders, with an emphasis on the mechanism of action for the main classes of anxiolytic and anti-depressants.
   Assessment 1
   Assessment Tool: Essay exam
   Assessment Date: Fall 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students enrolled
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 80% of students must score 70% or higher
   Who will score and analyze the data: Departmental faculty

Course Objectives

1. Identify naming conventions (e.g. Chemical, Generic, Brand, Street).
2. Interpret the key elements of a drug response curve (DRC).
3. Recall the meaning of "efficacy" versus "potency" and interpret a drug response curve accordingly.
4. Describe two ways that drug interactions are important and give an example of each.
5. Compare the meaning and the implications of the terms "therapeutic index" and "therapeutic window."
6. Identify the relative safety of nicotine, alcohol, opiates, and marijuana.
7. Explain the difference between pharmacokinetics and pharmacodynamics.
8. Remember the four phases of pharmacokinetics.
9. List the 4 main routes of administration.
10. Recognize the rationale for appropriate use of each route of administration.

11. Recognize the limitation of each route of administration.
12. Give an example of factors that influence metabolism.
13. Identify the effect of metabolism on drug tolerance.
14. Define lipid solubility and its effect on both distribution and pharmacodynamics.
15. Recognize the term "half-life" and its relevance to drug testing.
16. Compare elimination pattern of alcohol compared to most other psychoactive drugs.
17. Identify at least two pharmacological revolutions.
18. Outline the relationship between pharmacology and behavioral analysis.
19. Recognize at least two major figures in behavioral pharmacology.
20. Identify the difference between experimental and non-experimental research.
21. Recognize the independent and dependent variables and their operational definitions in an experiment.
22. Relate the principle of random assignment to the internal validity of a study.
23. Interpret the comparisons among groups in a typical drug experiment.
24. Restate the causes of the placebo effect.
25. Recall the key concepts of classical conditioning.
26. Restate the key concepts of classical conditioning based on different examples.
27. Recall the key concepts of operant conditioning.
28. Recognize the four schedules of reinforcement: fixed ratio (FR), variable ratio (VR), fixed interval (FI) and variable interval (VI).
29. Distinguish among four drug testing categories: unconditional behavior of non-humans, conditioned behavior of non-humans, conditioned behavior of humans, and reinforcing properties of drugs.
30. Define at least two common experimental techniques and the outcome of interest within each drug testing categories.
31. Interpret the results of drug discrimination protocols.
32. Recognize the steps in the FDA drug development process.
33. Describe and differentiate between pharmacokinetic tolerance and pharmacodynamic tolerance.
34. Recognize the effect of pharmacokinetic tolerance on drug-drug interactions.
35. Recognize the effect of pharmacodynamic tolerance on withdrawal.
36. Generalize opponent process theory to drug compensatory responses.
37. Define behavioral (conditioned) tolerance.
38. Recognize the role of classical conditioning of drug effects as the mechanism for behavioral tolerance.
39. Recognize the role of classical conditioning of compensatory effects as the mechanism for withdrawal/relapse in familiar drug taking environments.
40. Recognize the role of behavioral tolerance on drug overdose for people in recovery.
41. Identify the process of sensitization and cross-sensitization.
42. Define the placebo effect.
43. Recognize experimental techniques to measure placebo effects.
44. Describe the physiological mechanisms for the placebo effect in general.
45. Describe the physiological mechanism for the expectancy effect specifically.
46. Describe a balanced-placebo design and its purpose.
47. Identify the two cells in the nervous system.
48. State the functions of the glial cells in the nervous system.
49. State the functions of the neuron in the nervous system.
50. Describe the four main components of the neuron and their purposes.
51. Diagram the physical relationship between the presynaptic neuron, the postsynaptic neuron and the synapse.
52. Diagram the physical relationship between the presynaptic neuron, the postsynaptic neuron and the synapse.
53. Identify key terms in electrical communication for neurons, including the following: resting potential, charged ions, threshold, action potential, all-or-none principle, hyperpolarization and depolarization.

54. Explain the four processes responsible for maintaining the resting potential.
55. Outline the key steps as a neuron moves back and forth between its resting potential and depolarization.
56. Describe the basic process of neurotransmission, integrating both the electrical and chemical steps, including exocytosis and the process of neurotransmitters binding with their matching receptor sites.
57. Outline the steps involved in the "lifecycle" of the neurotransmitter including synthesis, storage, release, and metabolism or reuptake.
58. For each of the following eight neurotransmitters - dopamine, acetylcholine, norepinephrine, serotonin, gaba, glutamate, anandamide, and the endrophins - perform these actions: recognize if it is excitatory or inhibitory or both; recognize if it follows specific pathways in the brain or if it is found in a variety of brain sites, but not along any designated pathway; recognize one or more psychoactive drugs that directly targets this neurotransmitter; recognize one or more physical or mental disorders that has been linked to this neurotransmitter system.
59. Identify the three overarching "mechanisms of action" for psychoactive drugs: (1) changing the availability of a given neurotransmitter, (2) working directly at the receptor site for a particular neurotransmitter, or (3) working indirectly at the receptor site for a given neurotransmitter.
60. Recognize four examples of mechanisms that represent changing the availability of the neurotransmitter.
61. Recognize three examples of mechanisms that represent working directly at the receptor site.
62. Describe the two main divisions of the nervous system: central nervous system and the peripheral nervous system.
63. Identify the two main parts of the central nervous system: the brain and the spinal cord.
64. Describe the two main parts of the peripheral nervous system: the autonomic nervous system and the somatic nervous system.
65. Describe the two main parts of the autonomic nervous system: the sympathetic nervous system and the parasympathetic nervous system.
66. Give an example of two opposing effects of the sympathetic and parasympathetic nervous systems.
67. Recognize the hindbrain, the midbrain structures, and forebrain structures.
68. Identify the role of two parts of the hind brain: the cerebellum, and the medulla oblongata.
69. Describe the role of the medulla oblongata in drug overdose.
70. Identify the role of two midbrain structures: the reticular formation and the ventral tegmental area (VTA).
71. Describe the role of the ventral tegmental area as a vital component of the brain's reinforcing circuitry.
72. Identify the roles of five forebrain structures: the basal ganglia, the limbic system, the thalamus, the hypothalamus, and the cerebral cortex.
73. Recognize the relationship between the nucleus accumbens of the basal ganglia and the ventral tegmental area as part of the reinforcing properties of the brain.
74. Recognize the role of two key parts of the limbic system: the hippocampus and the amygdala.
75. Recognize at least three functions of the hypothalamus, including its relationship with the pituitary gland of the endocrine system.
76. Recognize the four lobes of the cerebral cortex.
77. Recognize the roles and location of the following parts of the cerebral cortex: the somatosensory cortex, the motor cortex, and the prefrontal cortex.
78. Recognize the role of the Diagnostic and Statistical Manual of Mental Disorders (DSM) in the diagnosis and description of substance use and addictive disorders.
79. Recognize that according to the medical community, addiction is described as a chronic, relapsing disorder.
80. Recognize the process and criteria for diagnosing a substance use and addiction disorder under the DSM-5.
81. Describe the significance of changing from two diagnostic categories in DSM-IV to one diagnostic category in DSM-5.

82. Describe the history and the basic tenets of the disease model of addiction.
83. Compare the two conceptualizations of the disease model: preexisting disease versus drug exposure disease.
84. Identify the concept of addiction as a learned behavior.
85. Describe the biopsychosocial model of addiction.
86. Describe the dependence (or negative reinforcement) model of addiction with physical and/or psychological withdrawal symptoms as the primary explanation.
87. Demonstrate understanding of the importance to addiction research when scientists realized one could be dependent and not crave or crave and not be addicted.
88. Recognize the difference between the concept of addiction as a function of negative reinforcement versus addiction as a function of positive reinforcement.
89. Recognize how neurological markers of psychological dependence are needed to validate the role of psychological dependence in the addictive process.
90. Explain how a negative reinforcement model is not sufficient to explain drug-seeking behavior.
91. Describe the main criticism of the positive reinforcement model of drug addiction, “the positive reinforcement paradox.”
92. Explain what is meant by the “dependence potential” of a drug and how it is established.
93. Trace the history of testing addiction on animals, including original obstacles.
94. Explain why current researchers are recommending we replace the phrase “reward center,” the idea that we “like” the drug, to simply the reinforcing center, the idea that we “want” the drug.
95. Explain, in general, how certain neural circuits in the brains can contribute to the craving experienced by subjects who abuse drugs.
96. Identify the two major functions of pharmacotherapy for drug addiction: reducing withdrawal symptoms and reducing drug reward, craving and relapse.
97. Recognize that treatment to reduce withdrawal symptoms is conducted via “substitution therapy” where gradually decreasing doses of a pharmacologically similar drug are administered.
98. Provide at least two examples of substitution therapy.
99. Recognize the potential advantage of substitution therapy even for long term treatment when the substitute drug has a better “safety profile” than the drug of abuse.
100. Recognize developing approaches to reduce craving that either interfere with the complex nerve systems that produce craving and/or work via immunization to the drug’s effect.
101. Identify whether cocaine is synthetic or obtained naturally, from a plant.
102. Recognize the country or countries, and the time period when cocaine was first used for medicinal, spiritual, and/or recreational purposes.
103. Identify at least two original purposes and at least one early route of administration for amphetamines.
104. Recognize at least one person who is associated with early exploration of cocaine's potential benefits.
105. Identify whether amphetamines are synthetic or naturally obtained from a plant.
106. Recognize the country/countries and time period in which amphetamines were first used for medicinal, spiritual, and/or recreational purposes.
107. Identify at least two original purposes and at least one early route of administration for amphetamines.
108. Recognize at least one person who is associated with early exploration of amphetamines’ potential benefits.
109. Explain the main routes of administration for amphetamines and their associated potential for toxicity and addiction.
110. Recognize the general distribution pattern of amphetamines and its metabolites and the subsequent influence on drug testing.
111. Describe the key factors that influence the metabolism of amphetamines, including common interactions with other drugs.
112. Explain the mechanism of action of amphetamines, as follows: recognize that the monoamines are the primary neurotransmitters that are directly targeted by the amphetamines; explain that the amphetamines increase the availability of the monoamines, by affecting the reuptake process and the release rate from the vesicles in the axon terminals.

113. Identify three primary physiological, subjective, and/or behavioral effects of amphetamines.
114. Describe the primary medical use of drugs that are categorized as amphetamines.
115. Describe two acute (physiological and/or behavioral) toxic effects of amphetamines.
116. Identify the primary physical and/or psychological symptoms associated with withdrawal from amphetamines.
117. Describe the self-administration pattern of amphetamines, including exacerbating or limiting factors.
118. Identify whether opioids are synthetic or naturally obtained from a plant.
119. Recognize the country/countries and the time period in which opioids were first used for medicinal, spiritual, and/or recreational purposes.
120. Identify at least two original purposes and at least one early route of administration for opioids.
121. Recognize at least one person who is associated with early exploration of opioids' potential benefits.
122. Explain the main routes of administration for opioids and their associated potential for toxicity and addiction.
123. Recognize the general distribution pattern of opioids and its metabolites and the subsequent influence on drug testing.
124. Describe the key factors that influence the metabolism of opioids, including common interactions with other drugs.
125. Explain the mechanism of action of opioids, as follows: recognize that the endorphins are the primary neurotransmitters that are directly targeted by exogenous opioids and their general locations in the brain; explain that exogenous opioids, natural, semi-synthetic and synthetic, work as agonists primarily at the endorphins' mu receptor sites.
126. Identify three primary physiological, subjective, and/or behavioral effects of opioids.
127. Identify whether cannabis is synthetic or naturally obtained from a plant.
128. Recognize the country/countries and time period in which cannabis was first used for medicinal, spiritual, and/or recreational purposes.
129. Identify at least two original purposes and at least one early route of administration for cannabis. Recognize at least one person who is associated with early exploration of cannabis' potential benefits.
130. Explain the main routes of administration for cannabis and their associated potential for toxicity and addiction.
131. Recognize the general distribution pattern of cannabis and its metabolites and the subsequent influence on drug testing.
132. Describe the key factors that influence the metabolism of cannabis, including common interactions with other drugs.
133. Explain the mechanism of action of cannabis, as follows: recognize that anandamide, 2AG and other endogenous cannabinoids are the primary neurotransmitters that are directly targeted by exogenous cannabinoids; recognize the relevant locations of the endogenous cannabinoids in the brain and the immune system; explain that the exogenous cannabinoids, such as THC and CBD, serve as agonists at CB1 and CB2 receptor sites.
134. Identify three primary physiological, subjective, and/or behavioral effects of cannabis.
135. Describe the medical use of cannabis.
136. Describe acute versus chronic toxic effects of cannabis.
137. Explain the mechanisms for the positive and negative effects of cannabis.
138. Recognize the effects of cannabis for which tolerance develops.
139. Identify the primary symptoms associated with withdrawal from cannabis.
140. Describe the self-administration pattern of cannabis for non-humans and/or humans, including exacerbating or limiting factors.
141. Identify whether tobacco is synthetic or naturally obtained from a plant.
142. Recognize the country/countries and time period in which tobacco was first used for medicinal, spiritual, and/or recreational purposes.
143. Identify at least two original purposes and at least one early route of administration for tobacco.
144. Recognize at least one person who is associated with early exploration of tobacco's potential benefits.
145. Explain the main routes of administration for tobacco and their associated potential for toxicity and

addiction.

146. Recognize the general distribution pattern of tobacco and its metabolites and the subsequent influence on drug testing.
147. Describe the key factors that influence the metabolism of tobacco, including common interactions with other drugs.
148. Explain the mechanism of action of tobacco, as follows: recognize that acetylcholine is the primary neurotransmitter that is directly targeted by the nicotine in tobacco and related products; explain that nicotine serves as an agonist at the nicotinic cholinergic receptors in the brain.
149. Identify three primary physiological, subjective, and/or behavioral effects of tobacco.
150. Describe the primary harmful effects of tobacco and/or nicotine.
151. Explain the mechanisms for the harmful effects in the cardiopulmonary system.
152. Recognize the effects of tobacco for which tolerance develops.
153. Identify the primary physical and/or psychological symptoms associated with withdrawal from tobacco.
154. Describe the self-administration pattern of tobacco, including exacerbating or limiting factors.
155. Recognize the country/countries and time period in which alcohol was first used for medicinal, spiritual, and/or recreational purposes.
156. Identify at least two original purposes and at least one early route of administration for alcohol.
157. Recognize at least one person who is associated with early exploration of alcohol's potential benefits.
158. Identify whether alcohol is synthetic or naturally obtained from a plant.
159. Recognize GABA as the main neurotransmitter directly targeted by alcohol and GABA's prevalence throughout the brain.
160. Describe the indirect effect of alcohol, including the most relevant GABA receptors and the specific targeted location on the receptor, separate from the orthosteric site.
161. Recognize that alcohol is a positive allosteric modulator for GABA.
162. Describe that glutamate is also directly targeted by alcohol, where alcohol serves as an antagonist at the NMDA glutamate receptor.
163. Identify three primary physiological, subjective, and/or behavioral effects of alcohol.
164. Describe two primary physical and/or health benefits of alcohol.
165. Describe two acute (physiological and/or behavioral) toxic effects of alcohol.
166. Describe two chronic physiological toxic effects of alcohol.
167. Explain the mechanisms for one or more of the positive and negative effects of alcohol.
168. Recognize the effects of alcohol for which acute tolerance develops.
169. Recognize the effects of alcohol for which chronic tolerance develops.
170. Identify the primary physical and/or psychological symptoms associated with withdrawal from alcohol.
171. Describe the self-administration pattern of alcohol for humans and non-humans, including exacerbating or limiting factors.
172. Recognize the main classification system for the diagnosis of anxiety and associated criteria as described by the current Diagnostic and Statistical Manual of Mental Disorders (DSM).
173. Recognize how there are similarities in the controversy over diagnosing addictive disorders and many mental disorders such as anxiety.
174. Recognize that anxiolytics can reduce anxiety and/or treat insomnia.
175. Describe the three main categories of anxiolytics (barbiturates, benzodiazepines, and z-drugs), the timing of their development and their respective safety profiles.
176. Recognize the factors for selecting an anxiolytic given the client's symptoms and risk for abuse.
177. Describe the key factors that influence the metabolism of anxiolytics, including common interactions with other drugs.
178. Explain the mechanism of action of anxiolytics, as follows: recognize GABA as the main neurotransmitter directly targeted by anxiolytics and GABA's prevalence throughout the brain; describe the indirect effect of the anxiolytics, including the most relevant GABA receptors and the various targeted locations (allosteric sites) on the receptors, separate from the orthosteric site.

179. Identify primary physiological, subjective, and/or behavioral effects of anxiolytics/sedative-hypnotics.
180. Describe the medical use of anxiolytics/sedative-hypnotics.
181. Describe the physiological and/or behavioral toxic effects of anxiolytics/sedative-hypnotics.
182. Explain the mechanisms for the positive and negative effects of anxiolytics/sedative-hypnotics.
183. Recognize the effects of anxiolytics/sedative-hypnotics for which tolerance typically develops.
184. Identify the primary symptoms associated with sedative-hypnotic withdrawal and low-dose withdrawal from anxiolytics/sedative-hypnotics.
185. Describe the self-administration pattern of anxiolytics/sedative-hypnotics for non-humans or humans, including exacerbating or limiting factors.
186. Recognize the main classification system for depression and associated criteria as described by the current Diagnostic and Statistical Manual of Mental Disorders (DSM).
187. Recognize the similarities in the controversy over diagnosing addictive disorders and many mental disorders such as depression.
188. Summarize the supporting and opposing evidence for the monoamine theory of depression.
189. Describe the glucocorticoid theory of depression.
190. Describe the three main generations of antidepressants (MAOI's, Tricyclics, and SSRI's/SNRI's), the timing of their development and their respective safety profiles.
191. Recognize the ongoing debate over the efficacy of the antidepressants and potential risks.

New Resources for Course

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

Level III classroom

Reviewer	Action	Date
Faculty Preparer:		
Anne Garcia	*Faculty Preparer*	*May 03, 2018*
Department Chair/Area Director:		
Starr Burke	*Recommend Approval*	*May 07, 2018*
Dean:		
Kristin Good	*Recommend Approval*	*May 08, 2018*
Curriculum Committee Chair:		
Lisa Veasey	*Recommend Approval*	*Jul 19, 2018*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Jul 22, 2018*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Jul 26, 2018*