

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

BIOLOGY 115 – BIOLOGY OF ALCOHOL AND OTHER DRUGS

3 hours lecture, 3 units

Catalog Description

Study of the biological principles underlying the effects of the major legal and illegal drugs on the human body. Survey of the commonly abused drugs with regard to their chemical nature, where and how they act, and the factors that modify their effects. Heavy emphasis is placed on how drugs act on neurons in the central nervous system.

Prerequisite

None

Course Content

- 1) Unifying themes
- 2) Classification based on the Controlled Substance Act
- 3) Psychoactive classification of drugs: stimulants, sedative hypnotics, narcotic analgesics, Cannabis products and hallucinogens
- 4) The Nervous System
- 5) The Synapse: neurotransmitters, receptors and ion channels
- 6) Administration methods
- 7) How the body handles drugs: absorption, distribution, metabolism, elimination
- 8) Tolerance and dependency
- 9) Mechanisms of addiction
- 10) Enzymes and other factors modifying drug effects
- 11) Cocaine and amphetamines
- 12) Tobacco and caffeine
- 13) Alcohol, barbiturates and other depressants
- 14) Opiates and other analgesics: pain pathways
- 15) Cannabis products
- 16) Hallucinogens
- 17) Steroids

Course Objectives

Students will be able to:

- 1) Describe how the methods of scientific inquiry are used to understand and resolve problems regarding the effects of drugs on the neurobiology of humans, and interpret graphs and charts that relate to knowledge of drug effects.
- 2) Classify drugs on the basis on their behavioral effects.
- 3) Identify parts of the nervous system that are affected by various drugs.
- 4) Explain how neurons communicate chemically using neurotransmitters.
- 5) Describe how drugs reach the brain via the circulatory system and compare the advantages and disadvantages of the different methods of drug administration.
- 6) Define the concept of tolerance to a drug and compare the mechanisms of enzymatic and cellular tolerance.
- 7) Recognize the role of psychological dependency versus physical dependency in drug abuse.
- 8) Describe how the body eliminates drugs including the role of enzymes, the liver and the kidney.
- 9) Explain how drugs can act as agonists, antagonists and facilitators of neurotransmitters.

- 10) Describe the effects of cocaine, amphetamines and other stimulants (including nicotine and caffeine) on the nervous system.
- 11) Describe the effects of alcohol and other depressants on the nervous system.
- 12) Explain how anti-anxiety agents work on the brain.
- 13) Describe the pathways in the brain involved in addictive behavior, how various drugs interact with those pathways and how specific genes may predispose a person to addictive behaviors.
- 14) Identify the pain pathways leading to the brain and describe the effects of opioids and non-steroidal anti-inflammatory drugs (NSAIDs) on those pathways.
- 15) Describe the effects marijuana, various hallucinogens, and steroids on the nervous system.
- 16) Obtain, analyze and synthesize current research on the effects of drugs on the body and society.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes and exams that measure students' ability to recognize, explain and provide examples of the concepts and principles associated with the biology of drugs on the human body.
- 2) Research papers which require students to obtain, analyze and synthesize current research on the effects of drugs on the body and society.
- 3) In-class activities in which students work in small groups to solve problems and develop critical thinking skills promoting student mastery of the subject matter.

Special Materials Required of Student

None

Minimum Instructional Facilities

Smart classroom

Out-of-Class Assignments

- 1) Assignments that require students to learn concepts about the biology of drug action
- 2) Research projects that require students to locate and analyze relevant source material regarding the biology of drug action

Method of Instruction

- 1) Traditional and computer-assisted lecture
- 2) Group projects and research paper
- 3) Discussion

Texts and References

- 1) Required (representative example): Julien, Robert et al. *Julien's Primer of Drug Action*. 14th edition. Worth Publishers, 2019. ISBN 9781429233439
- 2) Supplemental: None

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Describe how the methods of scientific inquiry are used to understand and resolve problems regarding the effects of drugs on the neurobiology of humans, and interpret graphs and charts that relate to knowledge of drug effects.
- 2) Classify drugs on the basis on their behavioral effects.
- 3) Identify parts of the nervous system that are affected by various drugs.
- 4) Explain how neurons communicate chemically using neurotransmitters.
- 5) Describe how drugs reach the brain via the circulatory system and compare the advantages and disadvantages of the different methods of drug administration.

- 6) Define the concept of tolerance to a drug and compare the mechanisms of enzymatic and cellular tolerance.
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