Fall 2020

BIOL 498-003: Biology of Addiction

Farzan Nadim

NJIT BIOLOGY

Course Syllabus

Fall 2020

BIOLOGY 498-003: Biology of Addiction

INSTRUCTOR:	Farzan Nadim (farzan@njit.edu)
VIRTUAL OFFICE HOURS:	T: 2-3 pm R: 10:30-11:30 am, or by appointment (links in Canvas)
COURSE SCHEDULE:	T,R: 9-10:30 am, synchronous online **COURSE WEBSITE:** Canvas

This course is online, but please follow the requirements below for all on-campus activities:

COVID-19 SAFETY REQUIREMENTS

All persons physically present in any department facility or classroom shall comply fully with the NJIT COVID-19 safety policy at all times. Masks must be worn before entry to all department facilities, and social distancing guidelines must be followed. Individuals who are unable to wear a face mask due to medical reasons should contact the Office of Disability Services or Human Resources. Students who enter a classroom without wearing a mask properly, or remove their mask, will be cautioned by the instructor. The same is true for students who disregard the seating order or guidelines for social distancing. Students with obvious symptoms of respiratory illness should not come to campus and will be asked to leave. Students who do not comply with a request by a department instructor to adjust their behavior, in accordance with the University Policy, will be subject to disciplinary actions. Instructors have the right to expel the student or terminate the class session at which any student fails to comply with the University Policy.

COURSE SUMMARY:

The course reviews the biological mechanisms of addiction as substance abuse. The biological mechanisms fall into three main categories: Brain systems involved, such as the mesolimbic reward system; Cells, such as midbrain dopaminergic neurons and their target cells in the striatum; Molecules, such as neurotransmitters, for example dopamine, norepinephrine and GABA and receptors such as cannabinoid receptors. The course also briefly discusses genetic factors involved in addiction.

TEXTBOOK/TECHNOLOGY:

Psychopharmacology, 3rd ed, by Jerrold S. Meyer, and Linda F. Quenzer. Oxford University Press
Student Resources: https://learninglink.oup.com/access/psychopharmacology-3e-student-resources

The course slack channel is **BiologyOfAddictionF20.slack.com**
Be sure to have access to Canvas, login with UCID.

LEARNING GOALS.

- To understand the definition of addiction and substances of abuse.
- To understand the basics of pharmacokinetics and pharmacodynamics.
- To describe neurotransmitters and neuromodulators and their receptors, and to understand the role of these molecules in brain function.
- To describe drug actions on different brain systems and outline which drugs lead to which effects according to their brain targets.

- To describe the major categories of drugs of abuse and to outline the mechanistic actions of each drug category.
- To further develop critical thinking skills. This will be measured in the ability to interpret graphs, experimental designs, and problem discussion. Students will be required to participate in instructor-led discussions of the material as they analyze problems and propose possible mechanisms related to addiction and the nervous system. Weekly quizzes will be used to test some of these goals and reinforce the learning of the material.

GRADING POLICY & SCALE:

Assignment	Percentage
Coures Participation & Quizzes (one per lecture)	20%
Projects (short essay-type questionnaires on topics related to Substance Abuse)	20%
2 Midterm Exams	40%
Final Exam	20%
TOTAL	**100%**

Grading Scale	
A	88.1 - 100
B+	80.1 - 88
B	73.1 - 80
C+	66.1 - 73
C	60.1 - 66
D	50.1 - 60
F	0 - 50

IMPORTANT RULES AND POLICIES

☒ The University Policy on Academic Integrity is strictly enforced.

☒ If you miss an exam due to a valid medical excuse you need to provide a doctor's note or other valid and verifiable documentation. The grade of exams missed for a valid reason will be determined on a case-by-case basis.

SCHEDULE AND COURSE OUTLINE: Class will meet twice every week, unless otherwise noted.

Introduction and course overview –

- Addiction and the Brain

Module 1: What is Addiction?

- Introductory Lectures
- DSM-5 definition of Substance Abuse
- What is Addiction?
- Is Addiction a Disease?

Module 2: Psychopharmacology

- Pharmacokinetics
- Pharmacodynamics
- Biobehavioral effects

Module 3: Structure and function of the nervous system

- Basic neuroanatomy
- The Limbic system including the amygdala and hippocampal structures
- The striatum and basal ganglia
- The midbrain dopaminergic systems and their targets
- The brainstem noradrenergic and serotonergic systems
- Cortical structures involved in mood and reward
- The Autonomic Nervous System

Module 4: Neurotransmitters and neuromodulators

- Glutamate
- GABA
- Catecholamines (dopamine and norepinephrine)

- Serotonin
- Acetylcholine

Module 5: Substances of abuse

- Cannabinoids
- Opioids
- Alcohol
- Sedative-Hypnotics
- Stimulants (Cocaine, Amphetamine, and Methamphetamines)
- Hallucinogens
- Nicotine and Caffeine
- Other substances (Ketamine, PSP, GHB, Inhalants and Steriods)