



SAS – SCHOOL OF ARTS AND SCIENCES

SCHOOL OF LIFE STUDIES AND HUMAN SCIENCES / LIBERAL ARTS
DEPARTMENT OF HEALTH HUMANITIES / PSYCHOLOGY
COURSE TITLE: DRUG ABUSE AND BEHAVIORAL ADDICTION
COURSE CODE: LSHHAD290 / LAPYAD290
3 semester credits

1. DESCRIPTION

This course examines the practice and basic principles of addiction to drugs of abuse such as heroin, alcohol, tobacco, cannabis or cocaine. Course topics will cover the epidemiology of drug abuse, the experimental models used in brain research, and the pathological consequences of drug addiction (including heavy drinking and smoking). The course will extend the concept of addiction to pathological behaviors such as compulsive consumption of palatable food, physical exercise dependence, compulsive shopping, sexual hyperactivity, internet abuse, and gambling. The neurochemical mechanisms that are shared and lead from reward to positive reinforcement, loss of control, and dependence will be examined. The symptomatological and neurochemical similarities and differences between drug and behavioral addiction will be addressed, along with the self-destructive behaviors, tolerance, craving, and withdrawal symptoms that both types of dependence produce. The course traces also the basic aspects of human biology and physiology that are needed to fully comprehend the topics at hand, including the neuronal circuits and neurotransmitters that are altered by both natural and artificial rewards. Students will also learn how to analyze scientific data and correctly interpret the information that is published in peer-reviewed international scientific journals. Finally, students will gain an understanding of the social and ethical implications of drug and behavioral addiction and of the peculiar features of this problem in different countries, with an emphasis on the European and Italian approach as compared with other areas of the world.

2. OBJECTIVES

Upon successful completion of this course, students will:

- Gain an understanding of the physiology and neurochemistry of the brain.
- Comprehend the mechanisms of action of drugs, the regulation of food intake, and the effects of physical exercise and other rewarding behaviors on brain circuitry.
- Be able to discriminate the effects and features of addictive drugs and behaviors and recognize the occurrence of reward, dependence, and addiction in humans and animals.
- Evaluate how and why natural rewards like food, sex, physical exercise, or internet use may lead to compulsive or pathological behaviors.
- Explore the diffusion of drugs of abuse in the world and understand the strategies implemented by different countries to address the problem.
- Learn how to analyze and interpret data from a scientific journal.
- Understand the medical, social, and ethical implications of drug and behavioral addiction.

3. REQUIREMENTS

The course does not require previous knowledge of biomedical subjects, although some familiarity with basic biology concepts is preferable (anatomy, physiology, biochemistry, etc.).

4. METHOD

This course consists of lectures, class discussions, and projects. Mediums for instruction used will include, but are not limited to, interactive and hands-on activities which challenge thought processes, academic texts and studies, videos, slides, guided problem solving, and experiential and/or field learning activities where applicable.

5. TEXTBOOK – FURTHER READINGS – RESOURCES

TEXTBOOK (Copy available at the university library):

Meyer, Jerrold S.; Quenzer, Linda F. *Psychopharmacology: Drugs, the Brain, and Behavior*, Sinauer Associates, 2018, 3rd edition.

The textbook is mandatory for successful completion of the course.

Where applicable, additional materials, handouts and/or notes will be provided by the instructor.

FURTHER READINGS

Rosenberg, Kenneth P.; Feder, Laura C. *Behavioral Addictions: Criteria, Evidence, and Treatment* Elsevier/Academic Press, 2014. Available [here](#).

Iversen, Leslie L.; Iversen, Susan; Bloom, Floyd E.; Roth, Robert H. *Introduction to Neuropsychopharmacology* Oxford University Press, 2009

LIBRARIES IN FLORENCE

Please consult the posted schedules for official opening times of the university library. Also note that the library is for consultation only and it is not possible to borrow materials. The library is equipped with a scanner and internet access so that you may save or email a digital copy of the pages needed.

Students may also utilize additional libraries and research centers within the local community:

BIBLIOTECA PALAGIO DI PARTE GUELFA

Located in Piazzetta di Parte Guelfa between Piazza della Repubblica and Ponte Vecchio. Please consult the library website for hours of operation:

http://www.biblioteche.comune.fi.it/biblioteca_palagio_di_parte_guelfa/

BIBLIOTECA DELLE OBLATE

Located in via dell'Oriuolo 26. Please consult the library website for hours of operation:

www.bibliotecadelleoblate.it

THE HAROLD ACTON LIBRARY AT THE BRITISH INSTITUTE OF FLORENCE

Located in Lungarno Guicciardini 9. Please consult the library website for hours of operation. This library requires a fee-based student membership. For information: www.britishinstitute.it/en

6. FIELD LEARNING

Please consult your Official Registration for any mandatory field learning dates. Field Learning Activities cited in Official Registrations are an integral part of the course and also include an assignment that counts towards your final grade, details will be provided on the first day of class.

7. COURSE MATERIALS

No additional course materials are necessary.

8. COURSE FEES

Course fees cover course-related field learning activities, visits, and support the instructor's teaching methodologies. Book costs are not included in the course fee. The exact amount will be communicated by the instructor on the first day of class.

9. EVALUATION – GRADING SYSTEM

10% Attendance
15% Class Participation
25% Midterm Exam
20% Final Project (Presentation and Paper)
30% Final Exam

A = 93-100 %, A- = 90-92%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 73-76%, C- = 70-72%, D = 60-69%, F = 0-59%, W = Official Withdrawal, W/F = Failure to withdraw by the designated date.

10. ATTENDANCE – PARTICIPATION

Academic integrity and mutual respect between instructor and student are central to the academic policy and reflected in the attendance regulations. Student presence is mandatory and counts toward the final grade.

Absences are based on academic hours: 1 absence equals 3 lecture hours.

Two absences: 6 lecture hours, attendance and participation grade will be impacted.

Three absences: 9 lecture hours, the final grade may be lowered by one letter grade.

Four absences: 12 lecture hours, constitutes automatic failure of the course regardless of when absences are incurred.

Please note:

- The above hours refer to lecture hours. Please note that the contact / credit hour policy in the academic catalog includes additional distribution ratios according to delivery category. Ex: 1 absence equals 6 FL/SL/Lab hours or 9 EL hours.

- Hours may be distributed in different formats according to the academic course schedules.

LATE ARRIVAL AND EARLY DEPARTURE

Arriving late or departing early from class is not acceptable. Two late arrivals or early departures or a combination will result in an unexcused absence. Travel is not an exceptional circumstance.

TRAVEL (OR DELAYS DUE TO TRAVEL) IS NEVER AN EXCUSE FOR ABSENCE FROM CLASS.

It is the student's responsibility to know how many absences are incurred. If in doubt, speak with your instructor!

Participation: Satisfactory participation will be the result of contributing to class discussions by putting forth insightful and constructive questions, comments and observations. Overall effort, cooperation during group work, proper care of work space and tools, responsible behavior, and completion of assignments will be assessed. All of the above criteria also apply to Field Learning and site visits.

11. EXAMS – PAPERS – PROJECTS

The **Midterm Exam** counts for 25% of the final course grade. For exam time and date consult MyFua. **The time and date of the exam cannot be changed for any reason.**

Format: the exam is divided into three sections:

- Part I: 10 Multiple choice questions. Each correct answer is worth 2 points, for a total of 20 points.
- Part II: 10 short-answer questions. Each correct and complete answer (concise explanations, main ideas, key words, names, etc.) is worth 5 points, for a total 50 points.
- Part III: two essay questions; each correct and complete answer is worth 15 points (based on content, vocabulary, detail, etc.) for a total of 30 points.

The **Final Project and Presentation** counts for 20% of the course grade.

- The final project will consist in writing a 6–10-page essay on one of the subjects covered in the Course. Students will previously discuss the specific topic of their project with the instructor. The essay should be written as a “short review” and should include, figures, tables and a bibliography in the typical format of peer-reviewed international scientific journals.
- The Presentation will be a Power Point slide overview of the final project to be presented in class on Lesson 14. The time allocated for each presentation will be previously agreed with the instructor.
- Material for research will be provided by the instructor and/or will be made available in the FUA-AUF Library in Corso Tintori 21.

The **Final Exam** counts for 30% of the final course grade. For exam time and date consult MyFua. **The time and date of the exam cannot be changed for any reason.**

Format: the exam is divided into three sections:

- Part I: 10 Multiple choice questions. Each correct answer is worth 2 points, for a total of 20 points.
- Part II: 10 short-answer questions. Each correct and complete answer (concise explanations, main ideas, key words, names, etc.) is worth 5 points, for a total 50 points.
- Part III: two essay questions; each correct and complete answer is worth 15 points (based on content, vocabulary, detail, etc.) for a total of 30 points.

12. LESSONS

Lesson 1	
Meet	In class
Lecture	Principles of drug action in the Central Nervous System
Objectives	<ul style="list-style-type: none">• Review the anatomy, physiology and neurochemistry of the brain• Understand the principles of drug action: the journey of drugs in the body (pharmacokinetics) and their mechanism of action (pharmacodynamics)• Identify the targets of drug action (receptors, channels, enzymes and transporters)
Readings/ Assignments	Chapter 1 of textbook: <i>Principles of Pharmacology</i> (excerpts) Chapter 2 of textbook: <i>Structure and Function of the Central Nervous System</i> (excerpts) Chapter 3 of textbook: <i>Chemical Signaling by Neurotransmitters and Hormones</i> (excerpts) Osmanoglu F (2013) The Journey of Drugs Through the Body: http://www.fountainmagazine.com/Issue/detail/the-journey-of-drugs-through-thebody-march-april-2013 ASHP Introduction to Pharmacokinetics and Pharmacodynamics.: http://www.ashp.org/DocLibrary/Bookstore/P2418-Chapter1.aspx

Lesson 2

Meet	In class
Lecture	Reward, dependence, and addiction
Objectives	<ul style="list-style-type: none"> • Identify natural and artificial rewards • Explore the constitutive elements of addiction (tolerance, dependence and toxic psychosis) • Analyze the hedonic effects produced by drugs, food and other rewarding behaviors and understand how they may lead to positive reinforcement and/or loss of control over their intake
Readings/ Assignments	<p>Chapter 9 of textbook: <i>Drug Abuse and Addiction</i></p> <p>NIH, National Institute on Drug Abuse (NIDA). Addiction Science: http://www.drugabuse.gov/related-topics/addiction-science</p> <p>Nestler EJ (2005) Is there a common molecular pathway for addiction? Nat. Neurosci. 8: 1445-1449.</p> <p>https://www.nature.com/articles/nn1578</p> <p>Writing assignment: Write a 1.5-2 page essay describing how natural and artificial rewards may lead to loss of control over their intake and therefore to addiction. Describe the common brain pathways that are involved in the initial hedonic effects produced by drugs of abuse, food and other behavioral rewards.</p>

Lesson 3	
Meet	In class
Lecture	History of drugs of abuse and experimental strategies
Objectives	<ul style="list-style-type: none"> • Review the origin and history of the principal drugs of abuse • Classify the drugs of abuse according to their diffusion, frequency of use, toxicity, and addiction liability • Understand the reasons for using experimental animal models and explore alternative strategies for drug addiction research
Readings/ Assignments	<p>Chapter 4 of textbook: <i>Methods of Research in Psychopharmacology</i></p> <p>NIH, National Institute on Drug Abuse (NIDA). Drugs of Abuse: http://www.drugabuse.gov/drugs-abuse</p> <p>Society for Neuroscience. Animals in Research: https://www.sfn.org/advocacy/animals-in-research</p>

Lesson 4	
Meet	In class
Lecture	Opioids and Central Nervous System stimulants
Objectives	<ul style="list-style-type: none"> • Learn the origin and classification of opioid drugs (morphine, heroin, codeine, methadone) and of CNS stimulants (amphetamines, cocaine), their pharmacological effects and their clinical use • Analyze the acute and chronic toxicity of these drugs and the reasons for their regulations on prescription or prohibition

	<ul style="list-style-type: none"> Recognize the distinct constitutive elements of addiction that apply to these drugs
Readings/ Assignments	<p>Chapter 11 of textbook: <i>The Opioids</i></p> <p>Chapter 12 of textbook: <i>Psychomotor Stimulants: Cocaine, Amphetamines, and Related Drugs</i></p> <p>NIH, National Institute on Drug Abuse. Opioids: https://www.drugabuse.gov/drugs-abuse/opioids</p> <p>NIH, National Institute on Drug Abuse. Heroin: https://www.drugabuse.gov/drugs-abuse/heroin</p> <p>NIH, National Institute on Drug Abuse. Cocaine: https://www.drugabuse.gov/drugs-abuse/cocaine</p>

Lesson 5	
Meet	In class
Lecture	Drug testing and analysis
Objectives	<ul style="list-style-type: none"> Explore the different methodologies for measuring the presence of drugs in human specimens (gas-chromatography, HPLC, mass spectrometry) Understand the technical and methodological problems that need to be addressed for each type of drug Learn how the chemical identification and quantification of a drug of abuse is carried out by professional personnel of the laboratory
Visit	Clinical Toxicology Laboratory, Local Health Service, Florence
Readings/ Assignments	<p>Chapter 3 in Introduction to Neuropsychopharmacology: Principles and Methods of Behavioral Pharmacology</p> <p>Lab tests online: https://labtestsonline.org/tests/drug-abuse-testing</p> <p>Writing assignment: Write a 1.5-2 page essay describing the ethical issues that are raised by using experimental animal models for biomedical research, and describe whether the use of alternative strategies is a possible and feasible option.</p>

Lesson 6	
Meet	In class
Lecture	Central Nervous System depressants and alcohol
Objectives	<ul style="list-style-type: none"> Learn the origin and classification of depressant drugs like barbiturates, anxiolytic drugs and alcohol, their pharmacological effects and their clinical use Analyze the acute toxicity and addiction liability of barbiturates and other sedatives Recognize the clinical features of social drinking and alcoholism, their impact on society and human health and the therapeutic strategies for recovery
Readings/ Assignments	<p>Chapter 10 of textbook: <i>Alcohol</i></p> <p>NIH, National Institute on Drug Abuse. Alcohol:</p>

	https://www.drugabuse.gov/drugs-abuse/alcohol Harvard Health Topics. Sedative, Hypnotic or Anxiolytic Drug Use Disorder: https://www.drugs.com/health-guide/sedative-hypnotic-or-anxiolytic-drug-use-disorder.html
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Lesson 7	
Meet	In class
Lecture	MIDTERM EXAM

Lesson 8	
Break	

Lesson 9	
Meet	In class
Lecture	Cannabis derivatives
Objectives	<ul style="list-style-type: none"> • Learn the chemical species and preparations that are derived from <i>Cannabis sativa</i> and <i>indica</i> • Understand the mechanism of action and the pharmacological effects of cannabinoids, and the rationale for their recreational and clinical use • Explore the new regulations regarding the clinical use of cannabinoids in Italy and USA
Readings/ Assignments	<p>Chapter 14 of textbook: <i>Marijuana and the Cannabinoids</i></p> <p>NIH, National Institute on Drug Abuse. Marijuana: https://www.drugabuse.gov/drugs-abuse/marijuana</p> <p>NIH, National Institute on Drug Abuse. Synthetic Cannabinoids (K2/Spice): https://www.drugabuse.gov/drugs-abuse/synthetic-cannabinoids-k2spice</p> <p>Writing assignment: Write a 1.5-2 page essay discussing the various classifications of the principal drugs of abuse and the similarities and differences in the constitutive elements of addiction produced by opioids, CNS stimulants, CNS depressants and cannabinoids.</p>

Lesson 10	
Meet	In class
Lecture	Club drugs and tobacco
Objectives	<ul style="list-style-type: none"> • Learn the origin and classification of hallucinogens and club drugs (LSD, ketamine, angel dust, ecstasy), their pharmacological effects, and their recreational and clinical use • Analyze the acute and chronic toxicity of these drugs, as well as their addictive features

	<ul style="list-style-type: none"> Recognize the clinical features of smoking and tabagism, their impact on society and human health, and the therapeutic strategies for recovery
Readings/ Assignments	<p>Begin research for the final project</p> <p>Chapter 13 of textbook: <i>Nicotine and Caffeine</i></p> <p>Chapter 15 of textbook: <i>Hallucinogens, PCP, and Ketamine</i></p> <p>NIH, National Institute on Drug Abuse. Club Drugs: https://www.drugabuse.gov/drugs-abuse/club-drugs</p> <p>NIH, National Institute on Drug Abuse. MDMA (Ecstasy/Molly): https://www.drugabuse.gov/drugs-abuse/mdma-ecstasymolly</p> <p>NIH, National Institute on Drug Abuse. Tobacco, Nicotine and E-cigs: https://www.drugabuse.gov/drugs-abuse/tobacconicotine-e-cigs</p>

Lesson 11	
Meet	In class
Lecture	Behavioral addiction
Objectives	<ul style="list-style-type: none"> Identify pathological behaviors such as compulsive consumption of palatable food, physical exercise dependence, compulsive shopping, sexual hyperactivity, internet abuse, and gambling Explore the symptomatological and neurochemical similarities and differences between drug and behavioral addiction Examine the self-destructive behaviors, tolerance, craving and withdrawal symptoms produced by behavioral addictions
Readings/ Assignments	<p>Chapter 1 in Behavioral Addictions: Criteria, Evidence, and Treatment: An Introduction to Behavioral Addictions</p> <p>Chapter 3 in Behavioral Addictions: Criteria, Evidence, and Treatment: Behavioral Addiction: The Nexus of Impulsivity and Compulsivity</p> <p>Grant et al. (2010) Introduction to Behavioral Addictions. <i>Am J Drug Alcohol Abuse</i> 36: 233–241. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3164585/</p> <p>Wikipedia. Behavioral Addiction: https://en.wikipedia.org/wiki/Behavioral_addiction</p>

Lesson 12	
Meet	In class
Lecture	Food addiction and eating disorders
Objectives	<ul style="list-style-type: none"> Identify the two complementary drives that govern food intake: the homeostatic pathway and the hedonic pathway. Understand how the hedonic pathway is regulated by reward-based triggers and shares similar neuronal mechanisms with other natural rewards (like sex and physical exercise) or artificial rewards (such as drugs of abuse).

	<ul style="list-style-type: none"> Examine the most common eating disorders (anorexia, bulimia, binge eating) and explore their neurochemical mechanisms and repercussions on health.
Readings/ Assignments	<p>Chapter 7 in Behavioral Addictions: Criteria, Evidence, and Treatment: Food Addiction: Evidence, Evaluation, and Treatment</p> <p>Chapter 8 in Behavioral Addictions: Criteria, Evidence, and Treatment: New Directions in the Pharmacological Treatment of Food Addiction, Overeating, and Obesity</p> <p>Ziauddeen and Fletcher (2013) Is food addiction a valid and useful concept? <i>Obes Rev</i> 14: 19–28.</p> <p>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3561707/</p> <p>NIH, National Institute of Mental Health. Eating Disorders: https://www.nimh.nih.gov/health/topics/eating-disorders/index.shtml</p> <p>Writing assignment: Write a 1.5-2 page essay discussing the various types of eating disorders, the resulting consequences on behavior and health of the affected subjects, and the CNS mechanisms that may underlie these pathological conditions.</p>

Lesson 13	
Meet	In class
Lecture	Other behavioral addictions: physical exercise, internet, and gambling
Objectives	<ul style="list-style-type: none"> Examine how excessive and inappropriate physical exercise may become a pathological behavior and a health problem Explore the clinical features of other behavioral addictions like internet abuse, compulsive shopping, and sexual hyperactivity Recognize the social and health problems associated with gambling
Readings/ Assignments	<p>Chapter 13 in Behavioral Addictions: Criteria, Evidence, and Treatment: Exercise Addiction</p> <p>Chapter 5 in Behavioral Addictions: Criteria, Evidence, and Treatment: Internet Addiction Disorder: Overview and Controversies</p> <p>Chapter 6 in Behavioral Addictions: Criteria, Evidence, and Treatment: Social Networking Addiction: An Overview of Preliminary Findings</p> <p>Chapter 3 in Behavioral Addictions: Criteria, Evidence, and Treatment: Diagnosis and Treatment of Gambling Disorder</p> <p>Addiction.com. Exercise Addiction: https://www.addiction.com/addiction-a-to-z/exercise-addiction/exercise-addiction-101/</p> <p>MedLine Plus. Compulsive Gambling: https://medlineplus.gov/compulsivegambling.html</p>

Lesson 14	
Meet	In class
Lecture	Slide presentations (Final Project due)
Objectives	Students shall present on a subject agreed upon with the instructor

Lesson 15	
Meet	In class
Lecture	FINAL EXAM