

SYLLABUS

BIOL 317/ PSY 317 Addiction: Biology, Psychology and Society

Fall Semester, 2005

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WebCT: <http://webct.ipfw.edu> (follow the login instructions and then click on this course.)

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Introduction

Addiction to alcohol and other drugs is a serious global problem that has major impact on Society. In American society, the socioeconomic impact is huge, and despite the availability of many social services, addiction is increasing at alarming rates. The problem is not limited to any age group or ethnic background. Using addiction to four compounds that have different modes of action and are among the most commonly abused substances, the course will provide introduction to understanding the biological, psychological, and psychosocial functioning of the human system. We will present conceptual understanding of the mechanisms of action upon body and mind and how addiction affects individuals, communities and society. We will not only use evidence-based principles, we will also teach *how* such knowledge is acquired, focusing on scientific methodology and critical thinking. Collaborative learning and service learning will also be utilized.

Course Objectives:

1. Teach scientific methods to non-science majors
2. Increase science literacy and critical thinking
3. Improve science related attitudes in non-science majors
4. Teach the application of scientific knowledge to social problems
5. Increase student involvement in civic engagement
6. Increase students' ability to engage in increasingly complex tasks during the course

Course goals:

1. To learn basic biological and biochemical processes in the context of human body
2. To explain the basics of, learning theory, sensation and perception, neurological and neuropsychological functioning
3. To describe and explain the structures and functions of the brain, involvement of genes, the effect of nutrition and the role of environment in the development of addiction
4. To explain the scientific method as applied in each of the sciences
5. To apply knowledge of psychological and biological processes to social problems.
6. To connect knowledge and skills with civic engagement

Course Resources:

Text : Due to the very nature of this course there is no specific text book is available for this course. However, extensive power point presentations have been generated for each topic. These are available on the WebCT Vista. (Note: sample PowerPoint lecture notes are attached as appendices)

Readings: Assigned readings in WebCT Vista and handouts provided in the classroom.

WebCT Vista: Assigned readings will be posted on WebCT for this class. You must have your student email account activated in order to access this course on WebCT. We will also make class announcements and post other materials on WebCT.

Exams: There will be exams over each module. They will consist of 50 multiple choice questions each and non-cumulative. You are expected to be present for the exams. In the event of a documented emergency and you notify one of us within 24 hours of the exam, you may take a makeup exam within one week of the original date.

Written/Oral assignments: All students are required to give an oral presentation based on their own literature review. This assignment will be an integration of literature from the three disciplines—biology, psychology, and nutritional chemistry—in keeping with our interdisciplinary approach. Students will have their topics approved by the instructors, and will work in collaborative pairs to produce the assignment. We, your instructors, will serve as your advisory panel as you develop your topic and search the literature for evidence-based publications. Be sure to use us and to come to us when you are struggling with any part of this assignment.

Service Learning: This course has a service learning component designed to connect your classroom learning to social issues of concern in the community. We will discuss several options for the service learning projects in class the beginning of the semester; the primary focus will be on developing educational programming for the campus community. Due dates and specific requirements will be provided on a separate handout.

Group Exercises: Periodically throughout the semester, there will be in-class small group exercises. Participation in these will earn points toward your final grade. You must be present for the entire exercise to receive credit; do not come in late and expect to get credit.

Attendance: Attendance in this course is mandatory and counts as part of your participation grade. We will take attendance, and you must be present for at least 75% of each class period to earn credit for attending.

Deadlines: Pay close attention to the deadlines for withdrawal, dropping or adding a class, that are listed in your schedule of courses. We cannot circumvent any deadline set by the University—meeting these deadlines is your responsibility.

Incompletes: You cannot take an Incomplete for a course in order to avoid a bad grade. Don't

even ask. Incompletes are only rarely given and only under very specific and documented emergency circumstances. In order to get an Incomplete, you also must have already completed 80% of the semester's work with a passing grade.

Students with disabilities: If you have a documented disability and are registered with the disability services office, you are entitled to certain accommodations. Make sure we get your paperwork as soon as possible so that we can make arrangements for these accommodations.

Plagiarism/cheating: Plagiarism is the presentation of someone else's work as your own without giving proper credit to the author. Do not plagiarize—this will result in a grade of "O" for the assignment in question. Also, do not cheat—this will also result in a grade of "O" for the exam or assignment in question.

Point Distribution

Activity Percent Points

Exams 40% 200
Project and oral presentation 20% 100
Collaborative learning exercises 20% 100
Service learning project 10% 50
Participation 10% 50
Total 100% 500

Grading scale: 90-100% -or- 450–500 points = A
80-90% -or- 400–449 points = B
70-80% -or- 350–399 points = C
60-70% -or- 300–349 points = D
< 60% -or- 000–299 points = F

Bad Weather/class cancellations: We will never cancel class because of bad weather; class is cancelled only when the campus is closed. Please do not call any of us or the Biology or Psychology Offices about class cancellations; call the campus operator or check the radio stations listed in your schedule of courses. *Please note that if the campus is closed on an examination date or a due date for an assignment, the exam date or assignment due date will automatically become the next class meeting.*

Guidelines for Oral Presentation: Each student is expected to give a 10 minute presentation on the selected topic. If two students are interested in the same topic, together they can give one coherent 20 minute presentation. Each presentation should include biological and psychological aspects of the topic. In addition, students should briefly mention related issues and be able to answer nontrivial questions. (Note: Appendix 4 shows rubric that provides information on evaluation criteria. Appendix 5 gives a list of topics covered by students in the fall of 2005)

Outlines of learning module and tentative schedule

Module 1: Introduction to human body and alcohol (6 weeks)

Part I: Introduction (2 weeks)

This part covers basic human biology that is relevant to addiction. The material covered in this part is applicable to all the modules that follow. The contents of this part are:

A.	Overview of human body	
i		Human organ systems
i		Life processes
i		Homeostasis
B.	Nervous system	
i		Integration and control of human body
i		Central and peripheral nervous system
i		Neurotransmitters and receptor binding
		Alteration of neuron receptor interaction due to substance abuse
C.	Addiction, dependence and tolerance	
i		Basic terminology
i		Disease Process
i		Effects of selected substances that are abused

Part II: Alcohol (4 weeks)

Biology: Alcohol is the most abused substance in the world. It exerts profound metabolic and physiological effects on all organ systems, especially on the central nervous system. Alcohol acts at many sites, including the reticular formation, spinal cord, cerebellum and cerebral cortex, and on many neurotransmitter systems. It enters the bloodstream very easily and crosses the blood brain barrier. Chronic drinking can lead to dependence and addiction and cause additional neurological problems. This module will describe absorption and metabolism of alcohol; development of tolerance and dependence; acute and chronic effects on the central nervous system and effects on the organ systems such as, cardiovascular system, hepatic system, and respiratory system; effects in pregnancy; interactions with other chemical substances (drugs). Students will explore involvement of pleasure seeking genes and relationship of alcoholism to pathological gambling. Biochemical basis and nutritional aspects will be integrated and controversial models of alcohol addiction are presented. Medicolegal, screening and privacy issues will also be discussed.

Psychology/Psychosocial: We will expand on the material regarding the effects on the central nervous system to discuss the effects on behavior, i.e., aggression, cognitive impairment, mood disturbance, sexual response. We will present learning theories of alcohol tolerance and dependence including the incentive-sensitization model, opponent-process model, physical dependence and positive reinforcement models, as well as cognitive theories of alcohol use and abuse such as the Health Belief Model, and the Gateway theory. Finally, we will present an integrated Biopsychosocial model of use and abuse that integrates the information from

different disciplines of the instructors. Further, we will present information about the relationship between alcohol addiction and other social problems such as domestic violence, crime, child abuse and neglect, fetal alcohol syndrome and suicide.

Module 2: Nicotine (3 weeks)

Biology: Nicotine, one of many active ingredients in tobacco products, is the ingredient that promotes compulsive use, abuse, and dependence. In both men and women, the prevalence of all types of chronic respiratory diseases (bronchitis, asthma, and impaired breathing) is directly related to the level of nicotine smoking. Nicotine is also a major cause of cancers of the lungs, larynx, mouth, and esophagus. It is a contributing factor in the development of cancers in the bladder, pancreas, and kidneys. This module will cover absorption of nicotine; mechanism of action and its effects on heart, gastro-intestinal tract, central nervous system, and pregnancy; development of tolerance and dependence; acute and chronic toxicity; and treatments. Relevant biochemical, nutrition and genetic aspects will be incorporated through reading. Current issues related to smoking will also be incorporated.

Psychology/Psychosocial Among the research on nicotine dependence and the learning theories of tolerance and addiction is also a body of research on nicotine and schizophrenia that demonstrates a relationship between nicotinic receptors in the central nervous system and certain clusters of psychotic symptoms. We will discuss the changes in mood and cognitive function associated with nicotine ingestion, as well as tolerance and dependence and the reinforcing effects of nicotine. Smoking cessation programs have been the subject of a growing body of research with behavioral approaches the primary focus. Personality factors also play a role in smoking, as does peer modeling, particularly for adolescents.

Module 3: Marijuana (2 weeks)

Biology: Marijuana is a mixture of leaves, stems and flowers of the Indian hemp plant *Cannabis sativa*, and is smoked or eaten for its hallucinogenic and pleasure-giving effects. Chronic marijuana users often develop an amotivational syndrome characterized by passivity, decreased motivation and preoccupation with drug taking. This module will reinforce concepts learned in modules one and two by exposing students to variations its physiological effects on cardiovascular, respiratory, and reproductive systems; its behavioral and subjective effects; and development of tolerance and dependence. Again biochemical, genetics and civic components will be included.

Psychology/Psychosocial: Amotivational syndrome, memory loss, as well as deficits in psychomotor performance characterize the behavioral and neuropsychological effects of marijuana use. Like alcohol intoxication, marijuana intoxication impairs reading comprehension, memory, speech, problem-solving ability and reaction time. Recent research has also provided evidence for the development of tolerance and dependence to marijuana.

Module 4: Psychostimulants – (2 weeks)

Biology: Compounds, producing excitement, euphoria, reduced sensitivity of fatigue and increased motor activity, belong generally to the psychostimulants. Psychostimulants such as cocaine, methamphetamine (crystal METH) and MDMA (ecstasy) are widely abused substances. Repeated use of METH and MDMA causes the development of severe addiction, aggression, violent and psychotic behavior, memory loss and neurodegeneration of central dopamine and serotonin pathways. Physiology, and biochemistry will be emphasizes in relation to development of toxicity, tolerance and dependence.

Psychology/Psychosocial: The behavioral effects of repeated use of psychostimulants are many, as are the psychosocial consequences. Among the effects of both acute use and chronic exposure are alterations in mood and behavior, as well as violent and aggressive behavior, psychosis, cognitive deficits, and criminal behavior. There also is evidence for a highly specific abstinence syndrome associated with psychostimulant use.

TENTATIVE TOPIC SCHEDULE

(Note: For details on what is covered in each module and for related civic issues please consult the table in section 1)

Date

Topic

Module 1. Alcohol

Part I:

Week 1-2

Introduction

Overview of human body

Human organ systems and life processes

Nervous system and alteration of neuron-receptor interactions

Addiction, dependence and tolerance

Part II:

Week 3-6

Alcohol absorption, distribution and elimination

Alcohol, CNS and health

Cognitive theories of alcohol use and abuse

Tolerance and dependence

Effects of alcohol on behavior: cognition and mood

Effects of alcohol on behavior continued

Alcohol use and social problems

Enzymes involved in alcohol metabolism during the state of addiction

Is there a genetic basis for alcohol addiction?

What is a gene? Are there pleasure seeking genes?

Genes vs. environment

Link between alcoholism and pathological gambling?

Useful facts about alcohol content of various types of drinks and health

Integration and review
Exam 1 Worth 80 points

Module 2. Nicotine

Week 7-9 Smoking and health
Smoking and health
Nicotine and behavior & mood
Smoking cessation and the reinforcing effects of nicotine use
Biochemical basis of nicotine addiction
Collaborative learning exercise
Integration and review
Exam 2 Worth 40 points

Module 3. Marijuana

Week 10-12 Central nervous system and marijuana
Behavioral and neuropsychological effects
Intoxication, tolerance, and dependence
Metabolism/collaborative learning exercises
Medicinal use of marijuana/collaborative learning exercises
Integration and review
Exam 3 Worth 40 points

Module 4. Psychostimulants

Week 13-14 Psychostimulants and augmentation of neurotransmitters
Psychosis, violence, and aggression
Social uses related to use of psychostimulants
Exam 4 Worth 40 points

Week 15-16 Student presentations

Websites sample reading assignments and other supporting materials

Sample PowerPoint presentations of lectures can be found in appendices.

For sample reading see following websites and appendices.

Addiction is a brain disease
<http://www.issues.org/17.3/leshner.htm>

Alcohol, wine and cardiovascular disease
<http://www.americanheart.org/presenter.jhtml?identifier=4422>

Beer, in moderation cuts risk of cataract and heart disease

<http://www.sciencedaily.com/releases/2000/12/001218073252.htm>

NIDA infofacts: Marijuana

<http://www.drugabuse.gov/Infofacts/marijuana.html>

Public health: Genes and nicotine addiction

<http://scienceweek.com/2004/sc041217-4.htm>

Susceptibility genes for nicotine addiction

<http://www.scienceblog.com/community/older/1999/B/199901892.html>

Nicotine and genes

http://muse.jhu.edu/journals/kennedy_institute_of_ethics_journal/v007/7.3wolpe.html

Food on the brain

<http://www.forbes.com/business/forbes/2005/0110/063.html>

Treating nicotine addiction

<http://bmj.bmjournals.com/cgi/content/extract/327/7428/1394>