

**Course Title: PHAR 6908 Drugs of Abuse**  
**Credits: 2.0**  
**Format: 2 consecutive 1 hour lectures per week**  
**Duration: 14 Weeks (Complete Semester, Jan. 22 – May 11, 2018)**

**Meeting Time, Place, Credits**

2.0 credits  
Course Web Site: <https://moodle2.umn.edu/>  
Term: Spring  
Dates: Mondays Jan. 22 – May 11, 2015  
**Location: Moos 7-135 (TC), 410 Lib (UMD) 3:30-5:30PM**  
Target audience: PharmD students

**Course Instructional Team** [See Documents on Instructional Roles as needed]

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## **Overview of the course**

### *Course content:*

This course examines the pharmacology, chemistry, and user-culture of drugs of abuse. Class lectures and activities are designed to provide a comprehensive examination of all classes of drugs of abuse and cover a diverse set of topics including chemical composition, pharmacology, characterization, detection, and legality. In addition, the underlying pharmacology of addiction and potential treatment options are discussed for each drug class and placed in the context of the Pharmacy profession.

The primary objective of this course is to familiarize students, researchers, and practitioners in health care professions with the basic medicinal chemistry of substances of abuse and associated paraphernalia. An emphasis is placed on understanding the molecular basis to mechanism of action and associated physiological effects such as tolerance and physical dependence. Significant effort will also be devoted to examining the synthesis and/or natural product extraction of illicit drugs to gain insight to chemical impurities that may be toxic to “users” and to practices and dangers associated with clandestine laboratory practices. Current treatments to drug abuse will be discussed for each drug class with, once again, a focus on molecular mechanism of action.

### *Course format:*

This course meets once a week for two 50 minute periods with 1 period dedicated to lecture-based delivery of content and the second reserved for active learning projects that involve student lead initiatives and projects. Lectures are delivered by course faculty and invited guests that bring a unique perspective to the current topic. Active learning activities are designed to engage students in projects that both educate and contribute to awareness of illicit drug use, manufacture, and treatment options. Student led projects are also developed (during the semester) based on student interests and topics/events that are relevant to current culture and societal problems related to drugs of abuse.

## **Prerequisites**

This course does not rely on prerequisite knowledge from other modules within the COP curriculum. However, to be successful in the course students must have taken Organic Chemistry I and have completed PHAR 6702.

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## **Computer/Technology Requirements**

The University of Minnesota computer requirements are listed here:

- <http://www1.umn.edu/moodle/start/technical.html>

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## **Course Goals & Objectives**

### **Three major long term learning goals and concepts:**

1. Understand the molecular pharmacology and physicochemical properties of drugs of abuse and how they relate to prescription drugs and OTC medications.
2. Recognize behavior in patients/customers and common paraphernalia and chemicals associated with illicit drug use and manufacture.
3. Possess critical knowledge of intervention, monitoring, and treatment as well as laws governing illicit drug use and trafficking.

## Course Modules

| Class  | Agenda/Topics   | Competency/<br>Learning Objective  | Activities<br>Assignments<br>Assessments | Comp.<br>Domains | Scientific<br>Foundations |
|--|---|--|--|------------------|---------------------------|
| <b>MODULE 1:</b><br>History of<br>Drugs of<br>Abuse/Illicit<br>Drugs | <b>Lesson 1:</b> Origins of illicit drugs and relationship to modern pharmaceuticals.<br><br><b>Lesson 2:</b> Illicit drugs impact on culture.  | Outline origins and history of drugs of abuse. Place illicit drug use in perspective of modern pharmaceuticals and current culture.  | Sign up in Class                         | 1,3              | 2,3,4,6                   |
| <b>MODULE 2:</b><br>Narcotics  | <b>Lesson 1:</b> Opium – natural products, heroin.<br><br><b>Lesson 2:</b> Opioids – synthetics.<br><br><b>Lesson 3:</b> Production and trafficking, detection<br><br><b>Lesson 4:</b> Prescription abuse   | Describe history and cultural significance of opium as a medicinal agent and drug of abuse. Equate potency with structural modifications of morphine. Demonstrate knowledge of pharmacology that leads to addiction and tolerance. Define methods of production, trafficking, policies and diversion of opioid pharmaceuticals.  | TBA                                      | 1,2,3,4,5,6      | 2,3,4                     |
| <b>MODULE 3:</b><br>Stimulants                                       | <b>Lesson 1:</b> In class Group Project 1: Narcotics Anonymous<br><br><b>Lesson 2:</b> Cocaine – natural product, isolation, pharmacology, pharmacokinetics<br><br><b>Lesson 3:</b> Cocaine – potency and structural modifications and formulation, paraphernalia<br><br><b>Lesson 4:</b> In class Group Project 2: Thematic Artwork Design Team<br><br><b>Lesson 5:</b> Methamphetamine – clandestine labs, mechanism of action, toxicity<br><br><b>Lesson 6:</b> In Class Group Project 3: Alcoholics Anonymous | Outline basic chemistry/structures and pharmacology of stimulants. Identify common paraphernalia and behaviors associated with stimulant use and abuse. List methods of detection and characterization. Apply pharmacology in the context of treatment options and relapse rates for highly addictive stimulants. Identify materials required for clandestine lab synthesis of stimulants and related laws and penalties associated with manufacture and use.<br><br>Demonstrate roles as team members and leaders to complete student group projects. | TBA                                      | 3,6              | 3,6                       |
| <b>MODULE 4:</b><br>Designer   | <b>Lesson 1:</b> Origin and structural classes.   | Outline structure, function, and pharmacology of designer drugs  | Exam 1 assigned &                        | 6                | 3,4,5                     |

|                                   |  |   |            |         |       |
|-----------------------------------|--|---|------------|---------|-------|
| Drugs                             | Phenethylamines, 2C compounds & analogs, Tryptamines, Bath Salts, cathinones<br><br><b>Lesson 2:</b> Pharmacology, toxicity, public policy<br><b>Lesson 3:</b> In Class Group Project 4: Drug Testing/Monitoring/Detection   | and synthetic origins. Place designer drugs in the context of historic use of drugs of abuse. Define legality and policy affecting designer drugs as well as methods of detection and characterization.   | completed. |         |       |
| <b>MODULE 5:</b><br>Depressants   | <b>Lesson 1:</b> Barbituates, Benzodiazapenes, GHB, Paraldehyde, Chloral Hydrate, Methaqualone, Glutethimide<br><br><b>Lesson 2:</b> In Class Group Project 5: Faculty-Student Password Game   | Outline relationship of prescription drugs with illicit drugs in this classification. Evaluate differences in the pharmacology of these drugs and relationship to physiological effects. Examine historical use patterns of users and current issues related to abuse of compounds in this class.         | TBA        | 1,2,3,6 | 3,4,5 |
| <b>MODULE 6:</b><br>Cannabis      | <b>Lesson 1:</b> Marijuana, Hashish, history, use statistics, legality, cultural significance<br><br><b>Lesson 2:</b> Pharmacology, pharmacokinetics, detection/testing, Cannabinoid receptors CB1, 2<br><br><b>Lesson 3:</b> In Class Group Project 6: Drug Paraphernalia | Describe underlying pharmacology of cannabinoids isolated from cannabis and structural characteristics of compounds that lead to function and selectivity. Describe differences in activity and therapeutic potential of compounds. Examine history of marijuana user statistics, legality, and policies. | TBA        | 3,4,6   | 4     |
| <b>MODULE 7:</b><br>Hallucinogens | <b>Lesson 1:</b> LSD, Psilocybin, Peyote, Mescaline, MDMA, PCP, origins, history, sacramental use<br><br><b>Lesson 2:</b> Pharmacology   | Describe pharmacology of hallucinogens and gain historical perspective on the use and culture of compounds in this class. Outline origins and history of sacramental use of hallucinogens in societies. Identify structural classes of compounds and differences in activity.                             | TBA        | 6       | 4     |
| <b>MODULE 8:</b><br>Inhalants     | <b>Lesson 1:</b> solvents (glues, paints, cleaning fluids/dusters), nitrous oxide<br><br><b>Lesson 2:</b> Nicotine (cigarettes)<br><br><b>Lesson 3:</b> In Class Group Project 7: UM-PD Visit/Law and Policy   | Describe mechanism of action of inhalants. Identify signs of inhalant abuse and common products purchased by users. Identify classes of compounds abused by users and OTC products associated with abuse. Describe toxicities associated with inhalant abuse.   | TBA        | 1,2,3,6 | 4     |

|   |  |   |        |           |     |
|---|--|---|--------|-----------|-----|
| <b>MODULE 9:</b><br>Performance Enhancing Drugs | <b>Lesson 1:</b> Steroids, HGH, amphetamines, PDE5 inhibitors, nitric oxide  | Describe mechanism of action of PEDs and designer drugs associated with abuse in athletics. Outline methods of detection and techniques used to avoid detection. Recognize signs of PED abuse. Define legality of PEDs and identify groups most frequently associated with PED abuse. | TBA    | 1,2,3,4,6 | 2   |
| <b>MODULE 10:</b><br>Methods of Detection       | <b>Lesson 1:</b> Detection and characterization of Drugs of Abuse in human samples<br><br><b>Lesson 2:</b> In Class Group Project 8: ER Treatment of DOA | Describe techniques and methods for detection of drug use. Outline handling practices and policies that govern drug testing.  | TBA    | 1,2,6     | 2,3 |
| <b>FINALS WEEK</b>                              | <b>Exam</b>  |   | Exam 2 |           |     |

## Attendance Policy

Mandatory. Failure to attend will result in a zero for activities graded in that class period.

## Course Materials

The following materials are suggested reading in this course:

- Buzzed: The Straight Facts about the Most Used and Abused Drugs, 4<sup>th</sup> edition, Norton and Co., 2014 (ISBN-10: 0393344517).

## Assessments and Grading

### Graded Assessments

This course is graded on a S/N basis and students will receive either Satisfactory or Non-satisfactory grade for completing the class work. Participation in three active learning activities is a requirement to earn a passing grade in the course. In addition, two written evaluations will be conducted: one at mid-term (week 7) and one due on the date of the final exam. Students will be required to write two 25 question multiple exams (at the mid-term and final-term) that will be evaluated by their peers and course faculty. The faculty and peer evaluation will be weighted equally by 50%. Evaluations will be conducted on a 100 point scale and students must earn a minimum average of 70 points to receive a passing grade in the class. Failure to complete the assignments by the end of the 7<sup>th</sup> week or the last day of class (i.e. the day of the final exam) will receive a failing grade. Student may elect to substitute a written review of a drugs of abuse related movie/video for one participation activity. The selection of the video/movie must be approved by course faculty. Grading of the written review will be conducted by course faculty on a 100 point scale (with a minimum of 70 points determining the passing grade).

The following graded assessments will count toward your final grade for this course in the following amounts:

| # | Date | Title<br>Brief description       | Assessment Goal<br>(required to link to domain)                                 | Points | % of final grade |
|---|------|----------------------------------|---|--------|------------------|
| 1 | TBA  | Group Project – Thematic Artwork | Design theme for artwork to represent cultural attitudes towards Drugs of Abuse | S/N    |                  |

|    |                    |   |   |     |     |
|----|--------------------|---|---|-----|-----|
| 2  | TBA                | Group Project – Paraphernalia sales           | Critical examination of sales/distribution of legal drug paraphernalia in the community.  | S/N |     |
| 3  | TBA                | Group Project – Student-Faculty Password Game | Associate drugs of abuse with symptoms, treatments, culture, chemistry, and pharmacology. | S/N |     |
| 4  | TBA                | Group Project – Narcotics Anonymous           | Understand genuine life stories of illicit drug use and addiction.                        | S/N |     |
| 5  | TBA                | Group Project – Alcohol Anonymous             | Understand genuine life stories of alcohol use and addiction.                             | S/N |     |
| 6  | TBA                | Exam 1, written take-home exam                | Show comprehension of chemistry and molecular pharmacology of illicit drugs.              | 100 | 50% |
| 7  | TBA                | Group Project – Law and Policy                | Understand legal issues and policies related to drugs of abuse.                           | S/N |     |
| 8  | TBA                | Group Project – Monitoring & Detection        | Gain knowledge of methods for detection and monitoring of users of drugs of abuse.        | S/N |     |
| 9  | TBA                | Group Project – Emergency medical treatment   | Examine ER visits and current treatment of DOA patients in the ER.                        | S/N |     |
| 10 | Finals Week<br>TBA | Exam 2, written take-home exam.               | Show comprehension of chemistry and molecular pharmacology of illicit drugs.              | 100 | 50% |

#### *Statement on Penalties for Late Work*

Assignments received beyond the due date will not be accepted and zero credit will be given for the work.

#### **Exam Policy**

Students will be required to write two 25 question multiple exams (at the mid-term and final-term) that will be evaluated by their peers and course faculty. The faculty and peer evaluation will be weighted equally by 50%. Evaluations will be conducted on a 100 point scale and students must earn a minimum average of 70 points to receive a passing grade,

#### *Absence from Exam*

Make-up exams will be given at the earliest possible convenience of the student missing the exam and will only be given to students that have missed the regular exam due to a verifiable emergency approved by the course faculty and the Office of Student Services. Vacations or other personal matters of choice will not be accepted as an excused absence.

#### **Grading Information**

This course is offered on an S/N basis only. Students must earn a minimum average of 70 points on the exams and participate in 3 assignments to earn a satisfactory grade. Failure to earn the minimum passing grade on any assignment results in a failure of the course.

#### *Minimum Passing Level*

70 percent on average of two exams and participation in active learning activities.

*Statement on Extra Credit* :::: None

### Minimum Passing Level

Per University and College Policy, students who receive a grade below S in this course must successfully repeat the course before advancing to courses which require this course as a prerequisite.

### Detailed Course Outline & Schedule\*

This course is designed to meet once a week, evening meeting time, for two concurrent 50 minute (ITV) lectures.

| Class   | Agenda/Topics   | Lecturer                            | Activities<br>Assignments<br>Assessments |
|---|---|-------------------------------------|--|
| <b>MODULE 1:</b> History of Drugs of Abuse/Illicit Drugs<br><b>Week 1</b> | <b>Lesson 1:</b> Origins of illicit drugs and relationship to modern pharmaceuticals.<br><b>Lesson 2:</b> Illicit drugs impact on culture.  | Ferguson                            | TBA                                      |
| <b>MODULE 2:</b> Narcotics<br><b>Week 2-3</b>                             | <b>Lesson 1:</b> Opium – natural products, heroin.<br><b>Lesson 2:</b> Opioids – synthetics.<br><b>Lesson 3:</b> Production and trafficking, detection<br><b>Lesson 4:</b> Prescription abuse   | Ferguson                            | TBA                                      |
| <b>MODULE 3:</b> Stimulants<br><b>Weeks 4-6</b>                           | <b>Lesson 1:</b> In class Group Project 1: Narcotics Anonymous<br><b>Lesson 2:</b> Cocaine – natural product, isolation, pharmacology, pharmacokinetics<br><b>Lesson 3:</b> Cocaine – potency and structural modifications and formulation, paraphernalia<br><b>Lesson 4:</b> In class Group Project 2: Thematic Artwork Design Team<br><b>Lesson 5:</b> Methamphetamine – clandestine labs, mechanism of action, toxicity<br><b>Lesson 6:</b> In Class Group Project 3: Alcoholics Anonymous | Ferguson<br>Rommel<br>(Lessons 2-3) | TBA                                      |
| <b>MODULE 4:</b> Designer Drugs<br><b>Weeks 7-8</b>                       | <b>Lesson 1:</b> Origin and structural classes. Phenethylamines, 2C compounds & analogs, Tryptamines, Bath Salts, cathinones<br><b>Lesson 2:</b> Pharmacology, toxicity, public policy<br><b>Lesson 3:</b> In Class Group Project 4: Drug Testing/Monitoring/Detection  | Ferguson                            | Exam 1 assigned & completed.             |
| <b>MODULE 5:</b> Depressants<br><b>Week 8-9</b>                           | <b>Lesson 1:</b> Barbituates, Benzodiazapenes, GHB, Paraldehyde, Chloral Hydrate, Methaqualone, Glutethimide<br><b>Lesson 2:</b> In Class Group Project 5: Faculty-Student Password Game  | Rommel                              | TBA                                      |
| <b>MODULE 6:</b> Cannabis   | <b>Lesson 1:</b> Marijuana, Hashish, history, use statistics, legality, cultural significance   | Ferguson                            | TBA                                      |

|  |  |  |        |
|--|--|--|--------|
| <b>Weeks 9-10</b>  | <b>Lesson 2:</b> Pharmacology, pharmacokinetics, detection/testing, Cannabinoid receptors CB1, 2<br><b>Lesson 3:</b> In Class Group Project 6: Drug Paraphernalia  |  |        |
| <b>MODULE 7:</b><br>Hallucinogens<br><b>Week 11</b>                  | <b>Lesson 1:</b> LSD, Psilocybin, Peyote, Mescaline, MDMA, PCP, origins, history, sacramental use<br><b>Lesson 2:</b> Pharmacology   | Ferguson                               | TBA    |
| <b>MODULE 8:</b><br>Inhalants<br><b>Weeks 12-13</b>                  | <b>Lesson 1:</b> solvents (glues, paints, cleaning fluids/dusters), nitrous oxide<br><br><b>Lesson 2:</b> Nicotine (cigarettes)<br><br><b>Lesson 3:</b> In Class Group Project 7: UM-PD Visit/Law and Policy | Ferguson<br>(Lesson 2)                 | TBA    |
| <b>MODULE 9:</b><br>Performance<br>Enhancing Drugs<br><b>Week 13</b> | <b>Lesson 1:</b> Steroids, HGH, amphetamines, PDE5 inhibitors, nitric oxide  | Shier                                  | TBA    |
| <b>MODULE 10:</b><br>Methods of Detection<br><b>Week 14</b>          | <b>Lesson 1:</b> Detection and characterization of Drugs of Abuse in human samples<br><br><b>Lesson 2:</b> In Class Group Project 8: ER Treatment of DOA   | Medtox<br>(lesson 1)<br><br>(lesson 2) | TBA    |
| <b>FINALS WEEK</b>   | <b>Exam</b>  |  | Exam 2 |

\* Subject to change at course instructor's discretion.

### [University of Minnesota and College of Pharmacy Policy Reference \(Centralized Syllabus\)](#)

[This page includes all required UMN and CoP policies, e.g., Academic Freedom; Copyright; Course Evaluations; Disability Accommodations; FERPA, etc.]