

**Drug Addiction
NROD66 (Rm AC-332)**

Instructor: Suzanne Erb
Office: SW-627A
E-mail: erb@utsc.utoronto.ca
Office hours: Mon 1-3 pm

COURSE DESCRIPTION

This course is designed to provide an overview of current topics in the field of drug addiction research, with a specific focus on the neuroscience of addiction. In the first part of the course, consideration will be given to the "Disease Model" of addiction - the prevailing model in the neuroscience field - as well as to alternative models that challenge the disease view. The second part of the course will comprise a series of student-led presentations and discussions on specific topics and recent studies in the field of addiction neuroscience.

SUMMARY OF COURSE EVALUATION

Mid-Term Exam	20%
Oral Presentation	20%
2 short critical review papers	15% X 2=30%
In-class demand essay	20%
Class attendance and participation	10%

BLACKBOARD

This course will be organized and managed using the U of T *Blackboard* system. Blackboard will be used to make class announcements, and to manage course materials.

SCHEDULE OF CLASSES AND ASSIGNED READINGS

****NOTE:** *Please see Page 5-8 of the syllabus for a list of weekly assigned readings*

Week 1 Sept 8	Course overview; <u>Lecture:</u> Defining Addiction: DSM and RDoC systems
Week 2 Sept 15	<u>Lecture:</u> The Neuroscience of Addiction: The Disease Model
Week 3 Sept 22	<u>Lecture:</u> Challenging the Disease Model (Hour 1); Substance use vulnerability in adolescence and young adulthood (Hour 2)
Week 4 Sept 29	<u>Lecture:</u> Craving, relapse, and reinstatement
Week 5 Oct 6	Term Test (Hour 1); Guidelines for Oral Presentations and Critical Reviews (Hour 2)
Week 6 Oct 13	READING WEEK
Week 7 Oct 20	“Incubation” of methamphetamine craving in a rodent model
Week 8 Oct 27	Sign versus goal tracking in rats: Implications for understanding cocaine addiction
Week 9 Nov 3	Choosing between drug and non-drug alternatives in rodent models of addiction
Week 10 Nov 10	Activation of drug craving by exposure to subliminal cues: Human studies
Week 11 Nov 17	Effects of prenatal cocaine exposure on responses to stress and reward- related stimuli in adolescence: Human studies
Week 12 Nov 24	Effects of amphetamine exposures on impulse control in healthy subjects: Implications for understanding addiction
Week 13 Dec 1	In-Class Demand Essay

COMPONENTS OF COURSE EVALUATION

TERM TEST

20% of final grade

The test will comprise a series of multiple choice and short answer questions based on the lecture material and readings in Weeks 1-4. Readings are meant to supplement the lecture material and will reinforce ideas from lecture.

ORAL PRESENTATION

20% of final grade

Each student will present on one article from the empirical literature in one of Weeks 7 (October 20) to 12 (November 24) of the course. Each week, 4-5 students will give presentations on the collection of papers assigned for that week. Although each student will give an individual presentation, all students presenting in a given week are expected to work as a group to complete the following tasks: 1) decide on who will present on which article for that week; 2) decide on what order the articles should be presented; and 3) create a class hand-out summarizing the major themes and objectives, research highlights and take-home messages of their set of articles. Although each student will give an individual presentation, presentations should be given within a broader conceptual framework that highlights areas of connection between the different studies for that week. Each presentation should be 20 min in duration, with 5 minutes for discussion. Presenters should take questions from the class, and should also have questions prepared in advance to pose to the class. Alternatively, students presenting in a given week may choose to lead a discussion on the full set of experiments, at the end of the class. In this case, a few minutes should still be given at the end of the individual presentation for student questions.

During class on Week 2 (Sept 15), students are asked to submit a first, second, and third choice for which series of papers they wish to present on (please indicate choice by Week; e.g., "1st choice: Week 8; 2nd choice: Week 9; ..."). Students wishing to form their own group, and to present in the same week, should submit one set of choices under all names. By Week 3 of class (Sept 16), assignments for the presentations will be posted to Blackboard.

SHORT CRITICAL REVIEWS

15% each of final grade

Students will write 2 short critical review papers, each based on any one set of articles (save for the set the student is presenting on) from Weeks 7-12 of the course. Each review will provide a critical analysis of the selected set of papers. The paper will be organized around a central thesis that has been identified and developed by the student. Each review will be 5-7 double-spaced, type-written pages (12 point font, 0.75-1.0 in margins); an additional page including the reference list must also be included. All formatting should be according to APA style or the Journal of Neuroscience.

Each review is due no later than the start of the class in which presentations of those papers is scheduled; papers are also expected to be submitted to Turnitin (see below for instructions) by this time. For example, if you chose to write a review on Week 8 papers, your paper will be due at the start of class on October 27, and should also be uploaded to Turnitin by this time. Extensions will be given only in exceptional circumstances; in such cases, students will need to provide a medical note 24 h in advance of the deadline, and evidence that they have been working on the paper (e.g., an developed draft). Otherwise, a penalty of 5% per day that the assignment is late will be applied.

IN-CLASS DEMAND ESSAY

20% of final grade

In the final class, students will write an essay on a question that they are provided with at the start of class. Students will be allowed to select from 2-3 questions. The questions will require students to reflect on overarching themes and ideas from the course, and to draw on specific examples from the primary literature comprising the reading lists each week to support their answers. Questions will not focus on any one particular set of readings, so students will not be at an advantage or disadvantage in responding to the questions based on what readings they focused on. However, the deeper the level of familiarity and understanding that a student has with all of the course material, the better prepared that student will be for this component of the evaluation.

Students are invited to bring to class and use any of the course materials in writing their essays. As well, students may handwrite their essays, or bring their laptops and submit an electronic version on a USB key at the end of class (USB keys will be returned to the student).

CLASS ATTENDANCE AND PARTICIPATION

10% of final grade

This component of the grade will be based on regular attendance and class engagement (e.g., asking questions, participating in discussion, etc). Six percent of this grade can be achieved by attending 11 of 12 classes. The additional 4% will be based on contributions in class.

LIST OF READINGS (BY WEEK)

Week 2:

Courtwright, David T., "The NIDA Brain Disease Paradigm: History, Resistance and Spinoffs" (2010). History Faculty Publications. Paper 2. http://digitalcommons.unf.edu/ahis_facpub/2

Leshner AI. Addiction is a brain disease, and it matters. *Science*. 1997 Oct 3;278(5335):45-7. PubMed PMID: 9311924.

Recommended Readings:

Koob GF. Negative reinforcement in drug addiction: the darkness within. *Curr Opin Neurobiol*. 2013 Aug;23(4):559-63. doi: 10.1016/j.conb.2013.03.011. Epub 2013 Apr 27. Review. PubMed PMID: 23628232.

Robinson TE, Berridge KC. Review. The incentive sensitization theory of addiction: some current issues. *Philos Trans R Soc Lond B Biol Sci*. 2008 Oct 12;363(1507):3137-46. doi: 10.1098/rstb.2008.0093. Review. PubMed PMID: 18640920; PubMed Central PMCID: PMC2607325.

Week 3:

Satel S, Lilienfeld SO. Addiction and the brain-disease fallacy. *Front Psychiatry*. 2014 Mar 3;4:141. doi: 10.3389/fpsy.2013.00141. eCollection 2013. Review. PubMed PMID: 24624096; PubMed Central PMCID: PMC3939769.

Week 4:

Recommended Readings:

Bossert JM, Marchant NJ, Calu DJ, Shaham Y. The reinstatement model of drug relapse: recent neurobiological findings, emerging research topics, and translational research. *Psychopharmacology (Berl)*. 2013 Oct;229(3):453-76. doi: 10.1007/s00213-013-3120-y. Epub 2013 May 18. Review. PubMed PMID: 23685858; PubMed Central PMCID: PMC3770775.

Sayette MA. The Role of Craving in Substance Use Disorders: Theoretical and Methodological Issues. *Annu Rev Clin Psychol*. 2015 Nov 11. [Epub ahead of print] PubMed PMID: 26565121.

Week 7:

“Incubation” of methamphetamine craving in a rodent model

- Caprioli, D., Venniro, M., Zhang, M., Bossert, J. M., Warren, B. L., Hope, B. T., & Shaham, Y. (2017). Role of dorsomedial striatum neuronal ensembles in incubation of

methamphetamine craving after voluntary abstinence. *Journal of Neuroscience*, 37(4), 1014-1027.

- Krasnova, I. N., Marchant, N. J., Ladenheim, B., McCoy, M. T., Panlilio, L. V., Bossert, J. M., ... & Cadet, J. L. (2014). Incubation of methamphetamine and palatable food craving after punishment-induced abstinence. *Neuropsychopharmacology*, 39(8), 2008.
- Li, X., Zeric, T., Kambhampati, S., Bossert, J. M., & Shaham, Y. (2015). The central amygdala nucleus is critical for incubation of methamphetamine craving. *Neuropsychopharmacology*, 40(5), 1297.
- Venniro, M., Zhang, M., Shaham, Y., & Caprioli, D. (2016). Incubation of methamphetamine but not heroin craving after voluntary abstinence in male and female rats. *Neuropsychopharmacology*, 42(5):1126-1135.

Week 8:

Sign versus goal tracking in rats: Implications for understanding cocaine addiction

- Flagel, S. B., Watson, S. J., Akil, H., & Robinson, T. E. (2008). Individual differences in the attribution of incentive salience to a reward-related cue: influence on cocaine sensitization. *Behavioural brain research*, 186(1), 48-56.
- Kawa, A. B., Bentzley, B. S., & Robinson, T. E. (2016). Less is more: prolonged intermittent access cocaine self-administration produces incentive-sensitization and addiction-like behavior. *Psychopharmacology*, 233(19-20), 3587-3602.
- Pitchers, K. K., Wood, T. R., Skrzynski, C. J., Robinson, T. E., & Sarter, M. (2017). The ability for cocaine and cocaine-associated cues to compete for attention. *Behavioural brain research*, 320, 302-315.
- Yager, L. M., & Robinson, T. E. (2015). Individual variation in the motivational properties of a nicotine cue: sign-trackers vs. goal-trackers. *Psychopharmacology*, 232(17), 3149-3160.

Week 9:

Choosing between drug and non-drug alternatives in rodent models of addiction

- Cantin, L., Lenoir, M., Augier, E., Vanhille, N., Dubreucq, S., Serre, F., ... & Ahmed, S. H. (2010). Cocaine is low on the value ladder of rats: possible evidence for resilience to addiction. *PloS one*, 5(7), e11592.
- Huynh, C., Fam, J., Ahmed, S. H., & Clemens, K. J. (2017). Rats quit nicotine for a sweet reward following an extensive history of nicotine use. *Addiction biology*, 22(1), 142-151.
- Lenoir, M., Cantin, L., Vanhille, N., Serre, F., & Ahmed, S. H. (2013). Extended heroin access increases heroin choices over a potent nondrug alternative. *Neuropsychopharmacology*, 38(7), 1209.

- Vandaele, Y., Cantin, L., Serre, F., Vouillac-Mendoza, C., & Ahmed, S. H. (2016). Choosing under the influence: a drug-specific mechanism by which the setting controls drug choices in rats. *Neuropsychopharmacology*, 41(2), 646.

Week 10:

Activation of drug craving by exposure to subliminal cues: Human studies

- Childress, A.R., Ehrman, R.N., Wang, Z., Li, Y., Sciortino, N., Hakun, J.,... O’Brein, C.P. (2008) Prelude to Passion: Limbic activation by “unseen” drug and sexual cues. *PlosOne*, 3(1):1506.
- Leventhal, A. M., Waters, A. J., Breitmeyer, B. G., Miller, E. K., Tapia, E., & Li, Y. (2008). Subliminal processing of smoking-related and affective stimuli in tobacco addiction. *Experimental and clinical psychopharmacology*, 16(4), 301.
- Wetherill, R. R., Childress, A. R., Jagannathan, K., Bender, J., Young, K. A., Suh, J. J., ... & Franklin, T. R. (2014). Neural responses to subliminally presented cannabis and other emotionally evocative cues in cannabis-dependent individuals. *Psychopharmacology*, 231(7), 1397-1407.
- Young, K. A., Franklin, T. R., Roberts, D. C., Jagannathan, K., Suh, J. J., Wetherill, R. R., ... & Childress, A. R. (2014). Nipping cue reactivity in the bud: baclofen prevents limbic activation elicited by subliminal drug cues. *Journal of Neuroscience*, 34(14), 5038-5043.

Week 11:

Effects of prenatal cocaine exposure on responses to stress and reward-related stimuli in adolescence: Human studies

- Chaplin, T. M., Freiburger, M. B., Mayes, L. C., & Sinha, R. (2010). Prenatal cocaine exposure, gender, and adolescent stress response: a prospective longitudinal study. *Neurotoxicology and teratology*, 32(6), 595-604.
- Chaplin, T. M., Visconti, K. J., Molfese, P. J., Susman, E. J., Klein, L. C., Sinha, R., & Mayes, L. C. (2015). Prenatal cocaine exposure differentially affects stress responses in girls and boys: Associations with future substance use. *Development and psychopathology*, 27(1), 163-180.
- Yip, S. W., Lacadie, C. M., Sinha, R., Mayes, L. C., & Potenza, M. N. (2016). Prenatal cocaine exposure, illicit-substance use and stress and craving processes during adolescence. *Drug and alcohol dependence*, 158, 76-85.
- Yip, S. W., Potenza, E. B., Balodis, I. M., Lacadie, C. M., Sinha, R., Mayes, L. C., & Potenza, M. N. (2014). Prenatal cocaine exposure and adolescent neural responses to appetitive and stressful stimuli. *Neuropsychopharmacology*, 39(12), 2824.

Week 12:

Effects of amphetamine exposures on impulse control in healthy subjects: Implication for understanding addiction

- Weafer, J., Burkhardt, A., & de Wit, H. (2014). Sweet taste liking is associated with impulsive behaviors in humans. *Frontiers in behavioral neuroscience*, 8.
- Weafer, J., & de Wit, H. (2013). Inattention, impulsive action, and subjective response to d-amphetamine. *Drug and alcohol dependence*, 133(1), 127-133.
- Weafer, J., Gorka, S. M., Hedeker, D., Dzemidzic, M., Kareken, D. A., Phan, K. L., & de Wit, H. (2017). Associations between behavioral and neural correlates of inhibitory control and amphetamine reward sensitivity. *Neuropsychopharmacology*, 42(9):1905-1913.
- Weafer, J., Lyon, N., Hedeker, D., & de Wit, H. (2017). Sweet taste liking is associated with subjective response to amphetamine in women but not men. *Psychopharmacology*, 1-10.

ADDITIONAL INFORMATION

TURNITIN

Normally, students will required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

All students are expected to submit their review papers to Turnitin at the same time they submit their printed copies to Prof Erb. Specific instructions for uploading your work to Turnitin will be provided on Blackboard.

STATEMENT REGARDING ACADEMIC INTEGRITY:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppjun011995.pdf>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

- Using someone else's ideas or words without appropriate acknowledgement;
- Submitting your own work in more than one course without the permission of the instructor;
- Making up sources or facts;
- Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

- Using or possessing unauthorized aids;
- Looking at someone else's answers during an exam or test;
- Misrepresenting your identity; and
- When you knew or ought to have known you were doing it.

In academic work:

- Falsifying institutional documents or grades;
- Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes; and
- When you knew or ought to have known you were doing so.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If students have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, they are expected to seek out additional information on academic integrity from their instructors or from other institutional resources.

Note:

You may see advertisements for services offering grammar help, essay editing and proof-reading. Be very careful. If these services take a draft of your work and significantly change the content and/or language, you may be committing an academic offence (unauthorized assistance) under the *Code of Behaviour on Academic Matters*.

It is much better and safer to take your draft to the Writing Centre as early as you can. They will give you guidance you can trust. Students for whom English is not their first language should go to the English Language Development Centre.

If you decide to use these services in spite of this caution, you must keep a draft of your work and any notes you made before you got help and be prepared to give it to your instructor on request.

STATEMENT REGARDING ACCESSIBILITY

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the *AccessAbility* Services as soon as possible.

AccessAbility Services staff (located in Rm SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

MISSED TERM WORK DUE TO MEDICAL ILLNESS OR EMERGENCY

All students citing a documented reason for missed term work (this includes assignments and midterm exams) must bring their documentation to the Undergraduate Course Coordinator, Ainsley Lawson, **within three (3) business days** of the term test / assignment due date. All documentation must be accompanied by the departmental [Request for Missed Term Work form](http://uoft.me/PSY-MTW) (<http://uoft.me/PSY-MTW>).

In the case of missed term work due to illness, only an **original copy** of the [official UTSC Verification of Illness Form](http://uoft.me/PSY-MED) (<http://uoft.me/PSY-MED>) will be accepted. Forms are to be completed in full, clearly indicating the start date, anticipated end date, and severity of illness. The physician's registration number and business stamp are required.

In the case of other emergency, a record of visitation to a hospital emergency room or copy of a death certificate may be considered.

Forms should be dropped off in SW427C between 9 AM - 4 PM, Monday through Friday.

Upon receipt of the documentation, you will receive an email response from the Course Instructor / Course Coordinator within three business days. The Course Instructor reserves the right to decide what accommodations (if any) will be made for the missed work.

Note that this policy applies only to missed term work (assignments and midterms). Missed final exams are dealt with by the Registrar's Office (<http://www.utsc.utoronto.ca/registrar/missing-examination>).

Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation.