Lectures: Tuesdays and Thursdays 11:00–12:30 PM, BL 342  
Instructor: Deb Stull, PhD  
Office: BL248C (opposite Bio main office)  
Office phone: 1-6140 (on campus); 215-204-6140 (off campus)  
Home phone: 215-793-4344 (but please, no calls after 9—I’m not as young as I used to be!)  
Office hours: Wednesdays, 9:00 AM – 12:00 PM and by appointment  
Pre-requisites: Systems Neuroscience or equivalent experience (as determined by the instructor)  
Credit hours: 3

Required Texts  
- Nestler EJ, Hyman SE, Malenka RC. Molecular Neuropharmacology. 3rd ed. NYC, New York: McGraw-Hill, Companies, Inc; 2015. This text will be the major source of readings for lecture. It is on reserve in the Paley Library. Note: it can be rented through Barnes and Noble or Amazon.  

Supplementary Materials  
- Readings from the primary literature will be assigned. These articles will be posted on Blackboard for you to download and print. Although some will be listed on the syllabus, others may be added/changed as needed or is appropriate. Announcements regarding this will be made in class. In addition, I would recommend that you check in with the folder on Blackboard periodically.  
- Also, information from the following textbook will also be used in class. Although you will get all of the information you need from the slides and the corresponding lectures, if you would like to review the basic neuroscience, these textbooks are good resources (and on reserve in Paley Library).  

Course Description  
Neuroscience is hot right now! It is one of the fastest growing areas in biology—it is the center of many of the new concepts and technologies being developed and advanced in the life sciences today. In particular, as the population ages and a greater number of people develop different disorders of the nervous system, interest in how to treat these disorders has increased. Therefore, in this course we will examine how drugs interact with the nervous system. Specifically, we will focus on the cellular and molecular actions of drugs such as opiates, marijuana, and cocaine on synaptic transmission as a mechanism for understanding the structure and function of the synapase overall. In addition, we will discuss how toxins and venoms affect synaptic transmission in nature as well as how they have been (and continue to be) used as research tools, allowing us to better understand and appreciate the complexities of synaptic transmission in the context of the wide variety of neurotransmitter systems. Through this
approach—of relating natural to experimental—students will be able to appreciate both the simplicity of synaptic design and the complexity of synaptic transmission in the historical context of the study of neuroscience.

Course Objectives
By the end of this course, you will be able to:
1. Describe the pharmacology of the biochemical mechanisms (including structure and function of the synapse) of neurotransmission
2. Explain current ideas about receptors, receptor signaling, and drug-receptor interactions
3. Explain chemical neurotransmission in the central nervous system in health and disease and its modulation by drugs
4. Appreciate how drug-induced changes can alter synaptic transmission in the historical context of neuroscience
5. Interpret and critique research papers from the neuropharmacology literature

Finally, it is my goal that you will enjoy this class and develop an appreciation for neuropharmacology!

Course Work/Grading
Overall
Grades will be based on scores on exams and homework assignments, which include problem sets and a student presentation. There will be 2 non-cumulative term exams and a cumulative final exam. The exams will consist of short answer and multiple-choice/true-false/fill-in-the-blank questions. See the schedule at the end of this document for the dates for problem sets and exams.

- Homework assignments (problem sets and presentation): 30%
- In-class exams: 40%
- Final: 30%

All exams are required of all students. The exam dates are listed at the end of this document and will not be changed barring extraordinary circumstances, so you can plan accordingly. If you are unable to take an examination as scheduled, it is your responsibility to contact me before the exam because unexcused absences from an exam will result in a score of 0 for that test. If it is an emergency that does not allow you to contact me before the exam, please contact me as soon as possible after the exam. Please note too, that I might request appropriate documentation for the situation. If you have 3 final exams scheduled for the same day and wish to see whether alternative arrangements can be made, you need to contact me by Monday, April 25, 2016.

Problem sets
The goal of the problem sets is to have students really apply what they are learning in this class to real-life questions/issues/problems that arise in the field of neuropharmacology. I have tried to relate them to the topics at hand and they will certainly require the inclusion of facts (either learned in class or from out of class research), they also definitely ask students to put those facts into a bigger picture, often arguing for or against something. Therefore, I definitely encourage students to work together—try out those arguments and evidence first! However, I do want to see individual work from each and every one of you. So get together and talk, discuss, argue, share resources, but then sit down and write your answers out on your own.
**Problem sets** that are turned in late will be marked down 5% each day they are late, and they must be turned in before those that were turned in on time are returned (typically on the following Tuesday, although please check with me if you are turning in your problem sets late).

**Presentations**
Because this is a huge, diverse field, I wanted to give you all the opportunity to present on any topic that we don't get a chance to cover (or we have covered in the briefest of ways) and in which you are interested. So it could be a drug, a technique, a disorder, a neuropharmacological mystery, and so on. However, the goal of this presentation is to really boil the information down into what is ESSENTIAL. That is absolutely a skill that all scientists need. So the specifics are that it has to be 3 slides and 5 minutes. You need to express in those 3 slides and 5 minutes: what this is, why it is important, and why you picked it. I would like to see you do this in small groups—say 2 or 3 to a group—because I think that collaboration is also an important skill (and can also make this more fun and less scary—safety in numbers!), but you can also do this on your own too, if you prefer. If you don't know anyone but are interested in working with someone else, please let me know, and I will help facilitate that. We'll talk more about this as the semester continues too but definitely keep this on your radar. I need to know groups and approve topics by Tuesday, May 29, 2016.

**Grading**
Since I would like to adhere to a strict point system for letter grades but typically have an overall class average that is on the low side, I am working to find something that will satisfy this requirement but will take into consideration the challenging nature of this course. And so I have constructed the following score/grade table. Please note that this table represents TOTAL score (ie, at the end of the semester)—no letter grades will be given out on individual assignments/exams.

<table>
<thead>
<tr>
<th>Letter grade</th>
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<tbody>
<tr>
<td>A</td>
<td>900+</td>
<td>C</td>
<td>600–649</td>
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<tr>
<td>A−</td>
<td>850–899</td>
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<td>B+</td>
<td>800–849</td>
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<td>C+</td>
<td>650–699</td>
<td>F</td>
<td>&lt;399</td>
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**Attendance**
Lecture attendance and punctuality, while strongly encouraged, are not required. Out of respect for your classmates, please try to come to class on time if you plan on coming to class. Also, please keep in mind that in lecture, I may cover some topics in greater detail than in they are covered in your text.

**Format**
In this course, you will learn the fundamentals of neural function at all of these levels through a variety of activities, including lectures, problem sets, and in-class exercises/discussions. Please note that you are responsible for all the material in the assigned chapters, including figures, summaries, and “boxes,” regardless of whether it is covered in lectures. Thus, you will be responsible for covering some material from the text or readings on your own.
**Blackboard/Class Communications**

Course announcements, assignments, and additional materials will be posted online using Blackboard. When available, lecture outlines will be posted. Updates to this syllabus (regarding topics and reading; exams and homework dates will remain fixed as much as possible [barring school closure and the like]) will be posted; please check periodically.

You will also receive important course announcements via your Temple email account. If you do not use your Temple email account, you need to activate it. If you have forgotten your password, you need to go to Computing Services and have them assign you a new password.

It is strongly recommended that you check your e-mail regularly. I may send messages—sometimes with attachments—to the class using this medium. You should also feel free to email me if you have any questions or problems. But please too feel free to call me as well, if you prefer a more personal communication. I am also available during the office hours listed above. If you would like to meet at another time, please don’t hesitate to e-mail or to call, and we can schedule a time to meet.

**Honesty and Civility**

You must abide by Temple's Code of Conduct (http://policies.temple.edu/getdoc.asp?policy_no=03.70.12), which prohibits:

1. Academic dishonesty and impropriety, including plagiarism and academic cheating.
2. Interfering or attempting to interfere with or disrupting the conduct of classes or any other normal or regular activities of the University.

I take plagiarism and other forms of cheating very seriously. If you have any questions as to whether something is plagiarism, please ask me, or, if that’s not possible, assume that it is and don’t do it! You are welcome to work together on the problem sets, but I still want to read your own individual work. And if your work requires you to do additional research, I want that to be in your own words too. If you are struggling with the material, please come and see me so we can talk through the material so that you are able to put the material in your own words. This is really important! I really don’t want to have to call you in to talk about this. Please too… no cheating during exams! No cells phones, no wandering eyes…. I so do not want to be running this class like a police state. You are all bright, capable adults and you absolutely can learn this material on your own. So please just show me that!!!!

**Disabilities**

Any student who has a need for accommodation based on the impact of a documented disability, including special accommodations for access to technology resources and electronic instructional materials required for the course, should contact me privately to discuss the specific situation by the end of the second week of classes or as soon as practical. If you have not done so already, please contact Disability Resources and Services (DRS) at 215-204-1280 in 100 Ritter Annex to learn more about the resources available to you. I will work with DRS to coordinate reasonable accommodations for all students with documented disabilities.

**Academic Rights and Responsibilities**

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02) which can be accessed through the following link: http://policies.temple.edu/getdoc.asp?policy_no=03.70.02.
**Final Note**

Neuroscience can be an amazingly revealing and rewarding discipline. It can also be tedious and difficult at times. I hope that you enjoy the class (at least some of it, some of the time!) and learn something from it. The topic of neuroscience is very timely and relevant these days, not only for your other courses, but also, perhaps in real life. There’s nothing like contemplating the brain for awhile to truly appreciate the complexities and intricacies of biology!

**Important:** this course is designed to educate students about a number of psychiatric and neurological diseases and treatments. However, the instructor of this course is not a medical professional. The information contained in this course, while believed to be correct and current, should not be regarded as medical advice, and should not be used for diagnosis or treatment.
TOPICS AND READINGS—TENTATIVE SCHEDULE

Please note that this is a tentative schedule and may be modified depending on how the course is progressing. All changes will be announced in advance, if possible, and students will be well aware of them—particularly regarding exams.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Topics</th>
<th>Assigned Readings: Bear</th>
<th>Homework Due</th>
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<tbody>
<tr>
<td>1</td>
<td>Week of 1/11</td>
<td>• Down at the &quot;pharm&quot;: basic principles of neuropharmacology</td>
<td>• Chapter 1; Shen WW. Compr Psychiatry. 1999;40:407-414. Speert D. Available at: <a href="http://www.brainfacts.org/Brain-Basics/Evolution/Aicles/2009/Toxins-and-Venoms">http://www.brainfacts.org/Brain-Basics/Evolution/Aicles/2009/Toxins-and-Venoms</a></td>
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<td>• Down at the &quot;pharm&quot;: basic principles of neuropharmacology; Let's talk... cell to cell: cellular basis of communication</td>
<td>• Chapters 1 and 2</td>
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<td>2</td>
<td>Week of 1/18</td>
<td>• I'll send an SOS to the next neuron: synaptic transmission</td>
<td>• Chapter 3</td>
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<td>3</td>
<td>Week of 1/25</td>
<td>• Rock down to electric avenue: signal transduction in the brain; I'm so excited, I just can't hide it: excitatory and inhibitory amino acids</td>
<td>• Chapters 4 and 5</td>
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<td>• I'm so excited, I just can't hide it: excitatory and inhibitory amino acids</td>
<td>• Chapter 5</td>
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<td>• Reach out and touch someone: widely projecting systems: monoamines, acetylcholine, and orexin</td>
<td>• Chapter 6</td>
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<td>5</td>
<td>Week of 2/8</td>
<td>• Pearls of wisdom... and sleeping, eating, and stress: neuropeptides</td>
<td>• Chapter 7</td>
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<td>• Pearls of wisdom... and sleeping, eating, and stress: neuropeptides; March to your own drummer: atypical neurotransmitters</td>
<td>• Chapters 7 and 8</td>
<td></td>
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<tr>
<td>6</td>
<td>Week of 2/15</td>
<td>• March to your own drummer: atypical neurotransmitters</td>
<td>• Chapter 8</td>
<td>PS 2 (2/18)</td>
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<td>• March to your own drummer: atypical neurotransmitters</td>
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<td>Week</td>
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<td>Lecture Topics</td>
<td>Assigned Readings: Bear</td>
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| 7    | Week of 2/22 | • Stay (faraway, so close): autonomic nervous system  
• EXAM 1 (2/25) | • Chapter 9 |  |
| 8    | Week of 2/29 | • SPRING BREAK |  |  |
| 9    | Week of 3/7 | • Stay (faraway, so close): autonomic nervous system  
• Hurts so good: pain and inflammation | • Chapter 9  
• Chapter 11: Iverson L. *Nature*. 1975;258:567-8 |  |
| 10   | Week of 3/14 | • Hurts so good: pain and inflammation  
• Get smart: higher cognitive function and behavioral control | • Chapter 11  
• Chapter 14; Jacobsen CF. *Arch Neurol*. 1993; 33: 358-369. | PS 3 (3/17) |
| 11   | Week of 3/21 | • Get smart: higher cognitive function and behavioral control  
• Get smart: higher cognitive function and behavioral control | • Chapter 14 |  |
| 12   | Week of 3/28 | • If you want more… more, more, more: reinforcement and addictive disorders  
• If you want more… more, more, more: reinforcement and addictive disorders | • Chapter 16 | Groups/ topics (3/29)  
  PS 4 (3/31) |
| 13   | Week of 4/4 | • Things fall apart: neurodegeneration  
• Things fall apart: neurodegeneration | • Chapter 18; Langston W. *Can J Neurol Sci*. 1984; 11:160-5 |  |
| 14   | Week of 4/11 | • When worlds collide: schizophrenia  
• EXAM 2 (4/14) | • Chapter 17 |  |
| 15   | Tuesday, May 3, 2016 10:30 AM – 12:30 PM | • FINAL EXAM |  |  |