

**DRUGS AND THE BRAIN**  
**MCB 62 / L&S 30 / PSYCH 119**

**Department of Molecular and Cell Biology**  
**College of Letters and Sciences, Discovery Course**  
**Department of Psychology**

**University of California, Berkeley - Fall Semester 2011**

Nowhere are the connections between chemistry, cell biology, physiology, botany, psychology, sociology, public policy, and constitutional law more vividly illustrated than in understanding the effects of drugs on the human brain and human behavior. This course will deal with just that: the biology, chemistry, psychology, and sociology of psychoactive drugs. Such substances - which include stimulants, sedatives, psychedelics, analgesics, antidepressants and antipsychotic pharmaceuticals, and others - have powerful effects on the human brain, behavior, and mental function. The origins of drugs as components of plants that have enjoyed deep historical relationships with humankind will be emphasized.

Two Required Lectures and one Required Discussion Section meeting each week.

Lecture times: Tuesday and Thursday at 3:30 - 5:00 pm - Wheeler Auditorium

Instructor: David Presti 249 Life Sciences Addition (LSA)  
phone and voicemail: 643 2111 <presti@berkeley.edu>

Office hours: Tue 1:00-1:30 pm, Wed 11:00-11:30 am, Thu 11:00 am-11:30 in 249 LSA.  
I will also generally be available after each lecture for questions and discussion.

Website: <http://mcb.berkeley.edu/courses/mcb62/> (limited materials)  
[bSpace.berkeley.edu](http://bSpace.berkeley.edu) (primary website)

Required texts: Course Reader at Copy Central, 2560 Bancroft Way  
*Pharmako/Poeia* by Dale Pendell North Atlantic Books  
*Pharmako/Dynamis* by Dale Pendell North Atlantic Books

Optional text: *Pharmako/Gnosis* by Dale Pendell North Atlantic Books

**Concerning the texts:** The *Pharmako* trilogy addresses the topic of psychoactive drugs via chemistry, botany, psychology, history, and, significantly, poetry. The author, Dale Pendell, is an outstanding poet and a very knowledgeable ethnobotanist. Reading these books will give you a perspective on psychoactive drugs unlike any other material written on these subjects. The books have recently (2010) been republished by North Atlantic Books in Berkeley. They are relatively inexpensive and, in my opinion, truly are works of art that one can come back to over and over again. I have read each of them multiple times and, like all good poetry, every time I read from them I appreciate new things. The current editions each have 4-5 pages of "supplemental notes" appended to the end, containing additional information that the author found particularly relevant to the subject. Other than these supplemental notes, the books are identical to earlier editions. The three books were originally published in 1995 (*Poeia*), 2002 (*Dynamis*), and 2005 (*Gnosis*) by Mercury House, and then, in 2009, issued in hardcover editions by North Atlantic Books. Any of the editions will do, as they are all the same, save for the several pages of supplemental notes in the most recent 2010 editions.

**Course reader:** The course reader contains detailed instructions for the homework assignments, guidelines for writing the term paper, and a number of important readings. Be sure to get the current Fall 2011 version of the reader, as readers from this class from other years contain different material.

Graduate student instructors and their email addresses:

Brian Isett	<brian.isett@berkeley.edu>
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The GSIs are here to help you get the most from this class. You are encouraged to get to know and talk with your GSI. Your GSI will see you in weekly Discussion Section and will also be available to meet with you during weekly office hours. Don't be shy!

Discussion section times and locations:

102	Tue	10-11	2062 VLSB	Levi
103	Wed	1-2	2070 VLSB	Robert
104	Wed	3-4	87 Dwinelle	Claire
105	Wed	2-3	2062 VLSB	Matar
106	Mon	1-2	2038 VLSB	Guy
108	Wed	9-10	2038 VLSB	Brian
109	Thu	1-2	30 Wheeler	Oscar
110	Fri	3-4	106 Wheeler	Guy
111	Fri	10-11	220 Wheeler	Brian
112	Mon	10-11	2038 VLSB	Guy
113	Mon	4-5	2066 VLSB	Claire
114	Fri	1-2	101 Wheeler	Levi
115	Tue	9-10	2038 VLSB	Levi
116	Wed	12-1	2032 VLSB	Robert
117	Thu	11-12	2038 VLSB	Matar
118	Thu	9-10	121 Wheeler	Robert
119	Mon	2-3	2070 VLSB	Nick
120	Tue	10-11	2066 VLSB	Oscar
121	Wed	12-1	2038 VLSB	Brian
122	Wed	1-2	2062 VLSB	Matar
123	Wed	2-3	2070 VLSB	Nick
124	Wed	4-5	187 Dwinelle	Nick
125	Thu	1-2	20 Wheeler	Claire
126	Tue	12-1	2062 VLSB	Oscar

**Prerequisites:** A passion to learn! There are no University course prerequisites for MCB 62 or L&S 30. Both non-science and science majors are encouraged to enroll, as the course has its foundations in both conventional science and in poetry. In PSYCH 119, there is a written term paper assignment, based on reading journal articles the primary scientific literature. In order to have the background to read and understand this literature, for PSYCH 119 there is a prerequisite of upper-division Biological Psychology (PSYCH 110) or equivalent course.

**Attendance at the lectures and in discussion section is required.** Lectures are every Tuesday and Thursday, 3:30 to 5:00 PM. While the factual content in the course can be learned by reading and obtaining notes from the lectures, attendance is required because we believe there are very important elements of the material that are best, if not exclusively, transmitted through in-person contact. Basically, there is more to learning than memorizing facts, even if memorizing some facts is important and is also part of what needs to be done in order to pass the exams.

Attendance may be monitored with periodic surprise quizzes during lecture. Any quizzes will be very short, consisting of a small number of questions. They will test material from recent lectures and reading. To be prepared to take the quizzes, stay current with your understanding of lecture and reading material.

#### **Homework:**

- detailed instructions for the homework assignments are in the course reader
- Homework One is a description and analysis of an article that you find from the news media
  - due in discussion section the week of **September 5-9**
- Homework Two is about plant rituals in your life
  - due in discussion section the week of **September 12-16**
- Homework Three is an annotated bibliography of reference material for your term paper
  - due in discussion section the week of **October 17-21**
- Homework Four is on the writing of exam questions
  - due in discussion section the week of **October 31-November 4**
  
- **Homework assignments must be turned in as paper copy in discussion section.**
- **Emailed assignments will not be accepted.**
  
- Assignments turned in up to one week after the due date will receive half-credit. Assignments turned in 1-2 weeks after the due date will receive zero points but will be credited as being turned in. Assignments received more than 2 weeks late may not be accepted. Note that this becomes a serious matter, since, as stated above, you need to receive credit for all four of the homework assignments in order to receive better than a C- grade (for a letter grade) or a passing grade (for a P/NP grade). Thus, be sure to complete your homework on time. This is not an arbitrary rule, but is done to encourage completion of the homework in the way that we believe to be most useful.
  
- There may be additional homework assignments during the semester should new ideas occur for interesting things to do.
  
- Homework assignments are meant to be interesting, informative, and enjoyable!

**Term Paper:**

- detailed instructions for the term paper are in the course reader
- your term paper must be submitted as both a paper copy and an electronic version
- the paper copy of your term paper must be in your GSI's hands by **Monday November 14** at 4 pm
- Your term paper may be turned in prior to this deadline and we encourage you to do so. A good time would be during discussion section prior to the due date. You may also turn the paper in during lecture on Thursday November 10. We suggest that you use this assignment as an opportunity to not wait until the last minute.
- The due date for electronic submission of your term paper at <www.turnitin.com> is midnight on Monday November 14. Note that the electronic submission is in addition to the paper copy turned in to your GSI.
- instructions for electronic submission will be provided in class
- The term paper is meant to be a fun assignment - an opportunity to learn more about a topic that you find particularly interesting. Hopefully there will be many such topics!

**Debates:**

- there will be three debates conducted in discussion section, with one-third of the class involved in each of the debates
- the first debate will be during the week **October 3-7** the second will be during the week **October 10-14**, and the third will be during the week of **November 14-16**
- debate guidelines are in the course reader
- debate topics will be announced in class
- we do our best to choose topics that will make for very interesting debates, where strong arguments can be made for both sides of the issue
- if ideas occur to you that would be interesting to consider as a debate topic, please let us know

**Exams** will consist of multiple choice and short answer questions. Each midterm exam covers the preceding portion of the course and draws from material in lectures, discussion sections, and required readings. A sampling of questions from past exams is contained in the course reader.

- Midterm Exam One is on **Tuesday September 27** at 3:30 - 5:00 pm in Wheeler Auditorium
- Midterm Exam Two is on **Tuesday October 25** at 3:30 - 5:00 pm in Wheeler Auditorium
- Midterm Exam Three is on **Thursday December 1** at 3:30 - 5:00 pm in Wheeler Auditorium
- **There will NOT be a cumulative final exam in this class.**
- we cannot change the days and times for these exams; mark your calendars now
- preparatory review sessions will be held at a time and place to be announced prior to each exam
- there will be no make-up exams
  - if you miss an exam, you will receive zero points for that exam
  - if you miss one of the first two midterm exams with a credible excuse (e.g., significant medical problem documented with verifiable documentation), then your other exams will count proportionally more in determining your course grade
  - if you miss the third midterm exam with a credible excuse, you will receive an incomplete (I) grade for the course (provided you have passing status in the class prior to the exam, otherwise grade = F); you will need to resolve the incomplete grade by taking a special exam

**Grading:** Your grade in the class is based on exam performance (three midterm exams) (~ 75-80% of your grade) and discussion section assignments (~ 20-25% of your grade). The discussion-section assignment portion of your grade comes from written homework assignments, participation in oral-group debates, and a term paper (5 pages for MCB 62 and L&S 30; 10-15 pages for PSYCH 119). For one of the debates you will be graded on your participation as part of a debate team; for the other two debates you will be graded on participation in the class discussion. The exact % contributions of the various exams, quizzes, and assignments will be determined at the end of the semester. I do not indicate the exact % contributions of the grade components at the beginning of the semester because I wish to discourage the running computation of points and accompanying preoccupation with how well one is doing in the class. The GSIs and I do not wish to hear questions of the form: "how well do I need to do on the last midterm exam in order to get an 'A' in the class?" Our answer to any questions of this sort will always be: do as well as you can on all exams and assignments! The task is to enjoy learning the material; the assignments and exams will hopefully assist with this.

**If you are taking this class for a letter grade, you cannot earn better than a "C-" grade without receiving credit for all of the homework assignments, participating in the debate, and turning in an acceptable term paper. If you are taking this class pass/not-pass, you must turn in all of the homework, participate in the debate, and turn in an acceptable term paper in order to pass the class.**

Your letter grade in the course will be determined according to absolute standards of performance. This hopefully relates to your acquisition of knowledge and understanding of the material. Importantly, you will not be competing against fellow students in the sense that we do not force letter grades to conform to a predetermined distribution. If everyone does extremely well, everyone could receive an "A" grade. If everyone does poorly (highly unlikely), then everyone could get a low grade. Rather than devoting energy to worrying about where grade cut-offs are, if you are truly interested in this subject and in getting the most from this class, we urge you to study seriously from the beginning, do the readings, and truly make an effort to learn the material. You will be rewarded with deep knowledge and understanding of some really fascinating topics. Good grades will be a natural side effect.

In past years the percentage of students earning an "A" or a "B" in this class has been between 60 and 70%. Thus, the majority of students do well in this class. However, in order to do well in the class you do have to learn a bunch of stuff. It is also easy to get a "C" or even lower grade in the class, if you don't put in sufficient effort.

Do not make the mistake of not keeping up with the material and then trying to negotiate a last-minute deal to improve your grade. In the reader there are some examples of desperate emails I have received in past years. It is very sad. We recommend that you not get yourself into the position of needing to write such emails. We do not offer extra credit or make other arrangements to boost grades. If you want a good grade, you must learn the course material in a timely manner. It's as simple as that.

**Cheating:** Anyone caught cheating on a quiz or exam will receive an "F" in the course and will also be reported to the University Office of Student Conduct. In past years, there have been situations in which students failed the class for talking to one another during an exam. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during the quizzes and exams.

**Plagiarism:** Your homework and term paper must be original writing composed by you. To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. The originality of your term paper will be checked against the entire worldwide web and additional databases of written material (see [www.turnitin.com](http://www.turnitin.com) for more information on this process).

**On Academic Integrity and Ethics in Science:** Cheating on exams and plagiarism are examples of violations in the realm of ethics and integrity. Honesty, integrity, and ethical behavior are of great importance in all facets of life. They are so important that it is generally assumed that one has learned and internalized these qualities at an early age. Such things rarely get explicitly addressed by the time one gets to be a university student. However, it cannot be overstated just how important honesty is to the scientific enterprise.

Science is concerned with developing explanatory frameworks through which we better understand our world. One hopes that through better understanding there will be a trend toward improvement of the conditions of life, resulting in less suffering and greater benefit to all beings. Obviously, the human trajectory is complicated, with many bumps and twists, but this is the hope. The tools of science are observation, experiment, and theory construction. Countless thousands of individuals are and have been engaged in this process of scientific exploration for centuries. Today, there are more working scientists than ever before in history. Scientists publish the results of their investigations in professional journals and books, and give lectures and classes on their work. Through these efforts the corpus of scientific knowledge accumulates and an expanded understanding of our world comes about.

It is implicitly assumed by all those who working in the scientific enterprise that everyone is being honest in their work and publication. The growth of scientific knowledge often builds upon the foundation of previous work, and if the previous work cannot be trusted the entire process is jeopardized. Thus, any scientist who is ever caught fabricating results, plagiarizing, or cheating in other ways is severely ostracized by the scientific community. In fact, even the suspicion that such things may have occurred can bring severe censure upon a working scientist. Careers have been ruined as a result of allegations that someone cheated on the publication of a scientific finding. Thus, most scientists go out of their way to insure that they are being honest in their activities.

We hope that your experience as a student here at UC Berkeley is fueled by passion for learning and is filled with fulfilling and joyous experiences. And we also appreciate that being a student can have its stresses. Sometimes one may be tempted to cheat in some way in an attempt to improve one's grade. This could be as blatant as having someone else sit for you in an exam, or turning in a written assignment that has been copied from another source. And it could be as subtle as glancing at a fellow student's exam when you are unsure of an answer to a question and are looking for some confirmation. One might do any of these things and not get caught, especially in the more subtle cases. However, if you cheat, no matter how much you may have learned in this class, you will have failed to learn perhaps the most important lesson of all.

**Communication and emails:** We like teaching this class! The material is fascinating and, we believe, useful and important stuff to know. I enjoy being available during office hours and after lectures to answer questions and further discuss the material. I greatly prefer in-person contact to email. That doesn't mean that I will never respond to email, but often my email inbox gets overloaded and I may not respond. **Always make sure to see me in person about any important matter.** It will never be an acceptable excuse to say to me something like: "Well, I sent you an email and never heard back." **As stated: Always make sure to see me in person about any important matter.**

We have tried to make this syllabus very complete. The detailed exposition of policies and procedures is presented for completeness. We do not mean to frighten you by speaking to things like attendance requirements, quizzes, penalties for late assignments, consequences of cheating, and so forth. If you are truly interested in this subject material and bring to the class a passion for learning, it is likely that none of this will even be relevant to you. The material in this class is truly very interesting and the majority of students do well and enjoy the class immensely. May it be so for you!

- University holidays

- no discussion sections or lectures on these days

Monday, September 5 - Labor Day, remember and honor the workers of the world

Friday, November 11 - Veteran's Day, remember and honor the military veterans of the world

Thursday, November 24 - Thanksgiving Day, give thanks

Friday, November 25 - day after Thanksgiving Day, continue giving thanks

- Important astronomical dates and days of ancient ritual

New Moons: August 28, September 27, October 26, November 24, December 24

Full Moons: August 13, September 12, October 11, November 10, December 10

Autumn Equinox: September 23

Halloween / Samhain: October 31

Winter Solstice: December 21

- reference for lunar and solar information

"Astronomical Applications Department of the US Naval Observatory"

<[www.usno.navy.mil/USNO/astromical-applications](http://www.usno.navy.mil/USNO/astromical-applications)>

Move forward with alchemy . . .

- approximate course timeline of topics, with corresponding readings indicated as item numbers from the Course Reader and page numbers from the *Pharmako* texts

<b>Week 1:</b> 25-26 Aug	Course logistics and overview. Drugs, poisons, plant medicines, allies, curanderos, abuse, addiction. (Reader 1,2,3,4,5,6,7,8) ( <i>Poeia</i> 1-27)
<b>Week 2:</b> 29 Aug - 2 Sept	How drugs enter the body and the brain. Nervous system, brain, cells, molecules, membranes. (Reader 9,10,11,12,13)
<b>Week 3:</b> 5-9 Sept	Neurons, synapse, neurotransmitters, receptors, pharmacology, autonomic nervous system, alkaloids, hallucinogenic solanaceous plants. (Reader 14,15,16,17,18) ( <i>Poeia</i> 29-30)
<b>Week 4:</b> 12-16 Sept	Tobacco and nicotine. (Reader 19) ( <i>Poeia</i> 31-50)
<b>Week 5:</b> 19-23 Sept	Alcoholic beverages, distillation, sedative-hypnotics, inhalants, general anesthetics. (Reader 20,21) ( <i>Poeia</i> 51-97)
<b>Week 6:</b> 26-30 Sept	Absinthe, essential oils, spices. ( <i>Poeia</i> 99-115) <b>Midterm Exam One</b> on Tuesday Sept 27.
<b>Week 7:</b> 3-7 Oct	Psychiatric conditions and medications. Clinical trials. Controlled substances and schedules. (Reader 22,23,24) <b>Debate One</b> in discussion section.
<b>Week 8:</b> 10-14 Oct	Cannabis. Opium, opioids, and endorphins. (Reader 25,26,27,28) ( <i>Poeia</i> 117-143, 177-225) <b>Debate Two</b> in discussion section.
<b>Week 9:</b> 17-21 Oct	Coffee, tea, caffeine, cacao, chocolate (Reader 29) ( <i>Dynamis</i> 1-118)
<b>Week 10:</b> 24-28 Oct	Ephedra, khat, amphetamine. (Reader 30) ( <i>Dynamis</i> 124-155) <b>Midterm Exam Two</b> on Tuesday October 25.
<b>Week 11:</b> 31 Oct - 4 Nov	Coca and cocaine. (Reader 31,32) ( <i>Dynamis</i> 156-177)
<b>Week 12:</b> 7-11 Nov	Addiction and treatment. (Reader 33) ( <i>Dynamis</i> 178-195)  <b>Term Paper</b> due on Monday November 14.
<b>Week 13:</b> 14-18 Nov	Psychedelics, LSD, magic mushrooms, psilocybin (Reader 34,35) <b>Debate Three</b> in discussion section.
For those who have the optional <i>Pharmako/gnosis</i> , the entire book concerns psychedelics.	
<b>Week 14:</b> 21-25 Nov	DMT, ayahuasca, peyote, mescaline.
<b>Week 15:</b> 28 Nov - 2 Dec	Nitrous oxide. Brain and mind. (Reader 36,37) ( <i>Dynamis</i> 228-231) <b>Midterm Exam Three</b> on Thursday December 1.