

## Term Information

Effective Term Spring 2015  
[Previous Value](#) Autumn 2014

## Course Change Information

### What change is being proposed? (If more than one, what changes are being proposed?)

Would like course to be considered for a GE course. Also changing title of course to be better descriptive of content.

### What is the rationale for the proposed change(s)?

Course is not open to students enrolled in the BSPS program. It was designed as part of a new minor program intended to reach other groups of students.  
Changing title to be better descriptive of content.

### What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

Would create another option for students to take to fulfill GE requirements. Title change would allow non BSPS majors to more readily understand topic of the course.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area	Pharmacy
Fiscal Unit/Academic Org	Pharmacy - D1800
College/Academic Group	Pharmacy
Level/Career	Undergraduate
Course Number/Catalog	2010
Course Title	Pharmacology: The Science Behind Drugs
<a href="#">Previous Value</a>	<a href="#">Fundamentals of Pharmacology</a>
Transcript Abbreviation	Pharm Sci of Drug
<a href="#">Previous Value</a>	<a href="#">Fundmtls Pharmacol</a>
Course Description	This course presents an overview of basic principles underlying drug action.
Semester Credit Hours/Units	Fixed: 3

## Offering Information

Length Of Course	14 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
<a href="#">Previous Value</a>	Yes
<a href="#">Previous Allow Multiple Enrollments in Term</a>	Yes
<a href="#">Previous Max Credit Hours/Units Allowed</a>	9
<a href="#">Previous Max Completions Allowed</a>	3
Course Components	Lecture
Grade Roster Component	Lecture

Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

## Prerequisites and Exclusions

### Prerequisites/Corequisites

Exclusions Not open to students with credit for 4400, or to students enrolled in the BSPS or PharmD programs.

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code	51.2010
Subsidy Level	Baccalaureate Course
Intended Rank	Freshman, Sophomore, Junior, Senior

## Requirement/Elective Designation

General Education course:

Biological Science

The course is an elective (for this or other units) or is a service course for other units

### *Previous Value*

*The course is an elective (for this or other units) or is a service course for other units*

## Course Details

### Course goals or learning objectives/outcomes

- Map a drug's general path in the body based on route of administration.
- Predict a drug's basic mechanism of action based on its target and understanding of a disease's pathophysiology.
- Identify factors contributing to varied drug response
- *Map a drug's general path in the body based on route of administration.*

### *Previous Value*

*Predict a drug's basic mechanism of action based on its target and understanding of a disease's pathophysiology.*

*Identify factors contributing to varied drug response*

## Content Topic List

- Intro
- Pharmacokinetics
- Pharmacodynamics
- Drug response factors
- Placebo effect
- Pharmacogenomics
- Drug toxicity
- How drugs alter enzyme, hormonal, autonomic, & CNS function
- Drug abuse/addiction
- Vaccines
- How drugs kill microbes

## Previous Value

- *Intro, Pharmacokinetics, Pharmacodynamics, Drug response factors, Placebo effect, Pharmacogenomics, Drug toxicity*  
*How drugs alter enzyme, hormonal, autonomic, & CNS function*  
*Drug abuse/addiction, Vaccines, How drugs kill microbes, etc.*

## Attachments

- PHR2010-GE Rationale and Assessment Plan.docx: GE Assessment Plan  
*(GEC Course Assessment Plan. Owner: Burke, Kelly Michelle)*
- PHR2010\_Nonmajor\_pharmacology\_syllabus.docx: syllabus  
*(Syllabus. Owner: Burke, Kelly Michelle)*

## Comments

- - The Registrar is currently accepting course changes for Spring 15. Please select that effective term. OUR course deadlines are posted here:<http://asccas.osu.edu/curriculum/important-deadlines>  
-It is not clear why the course would be repeatable. If it is, the faculty committee will need to see at least 2 sample syllabi.  
-Please write one course goal per box. Additional boxes can be generated by clicking on "Add."  
-The sample syllabus says it is a 2 credit course, but the form says 3 credits.  
-Full instructions on how to submit a course for GE Natural Science--Biological Science are here  
[https://asccas.osu.edu/sites/asccas.osu.edu/files/ASC\\_CurrAssess\\_Operations\\_Manual.pdf](https://asccas.osu.edu/sites/asccas.osu.edu/files/ASC_CurrAssess_Operations_Manual.pdf) See pp. 45-47. In addition to a syllabus (pp. 14-15), there should be a GE rationale document and a GE assessment plan document.  
*(by Vankeerbergen, Bernadette Chantal on 02/17/2014 04:48 PM)*

**COURSE CHANGE REQUEST**  
2010 - Status: PENDING

Last Updated: Kelley, Katherine Ann  
03/21/2014

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Burke, Kelly Michelle	02/04/2014 08:55 AM	Submitted for Approval
Approved	Kelley, Katherine Ann	02/04/2014 09:29 AM	Unit Approval
Approved	Kelley, Katherine Ann	02/04/2014 09:40 AM	College Approval
Revision Requested	Vankeerbergen, Bernadette Chantal	02/17/2014 04:50 PM	ASCCAO Approval
Submitted	Kelley, Katherine Ann	02/18/2014 07:11 AM	Submitted for Approval
Approved	Kelley, Katherine Ann	02/18/2014 07:11 AM	Unit Approval
Approved	Kelley, Katherine Ann	02/18/2014 07:15 AM	College Approval
Revision Requested	Vankeerbergen, Bernadette Chantal	02/18/2014 08:54 AM	ASCCAO Approval
Submitted	Burke, Kelly Michelle	02/18/2014 10:08 AM	Submitted for Approval
Approved	Kelley, Katherine Ann	02/18/2014 10:11 AM	Unit Approval
Approved	Kelley, Katherine Ann	02/18/2014 10:12 AM	College Approval
Revision Requested	Vankeerbergen, Bernadette Chantal	02/18/2014 10:17 AM	ASCCAO Approval
Submitted	Burke, Kelly Michelle	03/20/2014 11:35 AM	Submitted for Approval
Approved	Kelley, Katherine Ann	03/21/2014 06:59 AM	Unit Approval
Approved	Kelley, Katherine Ann	03/21/2014 06:59 AM	College Approval
Pending Approval	Vankeerbergen, Bernadette Chantal Nolen, Dawn Jenkins, Mary Ellen Bigler Hogle, Danielle Nicole Hanlin, Deborah Kay	03/21/2014 06:59 AM	ASCCAO Approval

## PHR2010, Pharmacology: The Science Behind Drugs

3 Credit hours

Fall 2014

### Instructor

Nicole Cartwright Kwiek, Ph.D.

kwiek.1@osu.edu

442 Parks Hall

614-688-5951

Office hours are held in 442 Parks Hall on Tue and Thurs, 3-4PM. Additional times are available upon request.

### Course description

This course overviews principles underlying drug action, including an investigation of current treatments for a variety of common diseases as well as discussion of new and upcoming therapeutic strategies.

### Course prerequisites

None

### Course learning outcomes

This course satisfies the Natural Science (Biological Science) General Education (GE) category. As such, after course completion, students will:

1. Understand the basic facts, principles, theories, and methods of modern science.
2. Understand key events in the development of science and recognize that science is an evolving body of knowledge.
3. Describe the inter-dependence of scientific and technological developments.
4. Recognize social and philosophical implications of the scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.

Specifically, students will be able to:

1. Map a drug's path in the body based on route of administration.
2. Predict a drug's general effect(s) based on its target and understanding of physiology/pathophysiology.
3. Identify factors contributing to varied drug response among a population.
4. Apply knowledge of pharmacological principles in developing new therapeutic strategies.
5. Pinpoint important historical pharmacological discoveries, identifying the role of scientific innovation and technology in advancing therapeutic treatments.
6. Critically evaluate contemporary (and sometimes) controversial therapies and/or drug-related issues.

### Course schedule

The lectures will be held on Tues, Thurs from 2:20-3:40PM in 1184 Postle Hall.

### Course materials

Recommended textbook: **Principles of Pharmacology, The Pathophysiologic Basis of Drug Therapy**, 3<sup>rd</sup> Edition by David E. Golan et al. 2012. ISBN: 978-1-60831-270-2. We also **highly recommend** that students purchase a clicker (Turning Point ResponseRF card, available at most bookstores). Announcements, class notes, assignments, syllabus, etc. will be posted on Carmen.

### Course policies

#### Grading policy

<b>Quizzes</b> (25% of the final grade)	100 pts
<b>Exams</b> (75% of the final grade)	<u>300 pts</u>
<b>Total</b>	<b>400 pts</b>

Your final grade will be calculated as follows:

**A** 93-100%, **A-** 90-92%, **B+** 87-89%, **B** 83-86%, **B-** 80-82%, **C+** 77-79%, **C** 73-76%, **C-** 70-72%, **D+** 67-69%, **D** 60-66%, **E** 0-59%

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### *Quizzes*

Quizzes will be given during most weeks of the class. Some will be accessible via Carmen while others will be delivered unannounced in class. Your two lowest quiz grades will be dropped. Any missed in-class quizzes will result in a zero for that grade. **No exceptions.**

### *Examinations*

There will three 100-point exams given during the semester: two midterms and a non-cumulative final exam. Typically, these exams will comprise multiple choice and short answer questions, including some data analysis questions. Makeup exams for any reason are approved at the discretion of the instructor, may be a different format than the regularly scheduled exam (e.g., oral), and will in the very least require documentation.

### *Attendance*

Attendance in class and recitations is not required but **highly suggested**. Students are expected to fully participate during class discussions, activities, etc. For your convenience, most course lectures will be captured and posted on Carmen. **Be aware that any live lectures that are not successfully captured due to technical difficulties will not be available or re-recorded.**

### *Extra credit*

Students may earn up to 6 bonus points by **answering** other students' questions on the Carmen discussion board. (1 answer = 1 EC point)

### **Academic Conduct:**

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct: <http://studentlife.osu.edu/csc/>.

### **Student Disability:**

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://ods.ohio-state.edu/>.

**Lecture schedule:**

<b>Date</b>	<b>Day</b>	<b>Lecture</b>	<b>Topic</b>	<b>Highlights</b>
8/28	Th	1	Intro	What is a drug?
9/2	T	2	Pharmacokinetics	Getting drugs in
9/4	Th	3	Pharmacokinetics	Getting drugs in and around
9/9	T	4	Pharmacokinetics	Getting drugs out
9/11	Th	5	Pharmacodynamics	Drug targets
9/16	T	6	Pharmacodynamics	Drug targets; dose-response
9/18	Th	7	Toxicity; factors affecting drug response	Age, disease, drug-drug interactions
9/23	T	8	Factors affecting drug response	Placebo effect
9/25	Th	9	Factors affecting drug response	Pharmacogenomics
9/30	T	10	<b>Exam 1</b>	
10/2	Th	11	How drugs alter enzyme function	COX and NSAIDs
10/7	T	12	How drugs alter enzyme function	PDEs and sildenafil
10/9	Th	13	How drugs alter hormonal function	Hormonal birth control
10/14	T	14	How drugs alter hormonal function	Diabetes
10/16	Th	15	How drugs alter autonomic function	Anatomy, function, survey of drugs
10/21	T	16	How drugs alter autonomic function	Nerve gas
10/23	Th	17	How drugs alter CNS function	Anatomy, function; depression
10/28	T	18	How drugs alter CNS function	Pain
10/30	Th	19	Drug abuse/addiction	Reward pathway, overview of drugs; marijuana
11/4	T	20	<b>Exam 2</b>	
11/6	Th	21	How drugs alter immune function	Asthma, allergies
11/11	T	22	<b>NO CLASS</b>	
11/13	Th	23	How drugs kill cells	Principles of chemotherapy; anti-cancer
11/18	T	24	How drugs kill cells	Antibiotics
11/20	Th	25	Re-thinking antimicrobial therapy	The microbiome
11/25	T	26	Vaccines	Flu, HPV vaccines, controversy
12/2	T	27	Drug testing	Clinical trial process
12/4	Th	28	Alternative therapies	Survey; establishing rigor in trials
12/9	T	29	Therapeutic frontiers	New-and-upcoming therapeutic strategies
Finals			<b>Final exam (non-cumulative)</b>	

## GE Rationale for PHR2010, Pharmacology: The Science Behind Drugs

### **A. How do the course objectives address the GE category expected learning outcomes?**

Please find below a list of the Pharmacology: The Science Behind Drugs course objectives and a subsequent discussion of how this learning maps to the expected outcomes of the GE Natural Science/Biological Science category.

After finishing this course, students will be able to:

1. Map a drug's path in the body based on route of administration.
2. Predict a drug's general effect(s) based on its target and understanding of relevant physiology/pathophysiology.
3. Identify factors contributing to varied drug response among a population.
4. Apply knowledge of pharmacological principles in developing new therapeutic strategies.
5. Pinpoint important historical pharmacological discoveries, identifying the role of scientific innovation and technology in advancing therapeutic treatments.
6. Critically evaluate contemporary (and sometimes) controversial therapies and/or drug-related issues.

#### **GE outcome: Students understand the basic facts, principles, theories, and methods of modern science.**

In learning pharmacology, students will broadly enrich their scientific understanding of the human body and health. For instance, in order to achieve objectives #1-4, students must apply concepts from basic human anatomy, physiology, genetics, chemistry, and others. The science behind drug action is a compelling, interdisciplinary context by which to study a variety of scientific fields.

#### **GE outcome: Students understand key events in the development of science and recognize that science is an evolving body of knowledge.**

#### **GE outcome: Students describe the inter-dependence of scientific and technological developments.**

Once the pharmacology principles have been introduced, we will investigate specific diseases and their relevant drug therapies. In doing so and in order to achieve our objective #5, we must overview the historical trajectory of treatment options, including discussion of how pharmacotherapy has changed with an expanding knowledge base and technological advancement. A nice example of this is diabetes; we will be able to talk about the evolution of diagnostic tools (e.g., from urine tasting to blood testing), drug delivery devices (e.g., the failed insulin inhaler), and new drug classes (e.g., the newer GLP analogs derived from the saliva of gila monsters).

#### **GE outcome: Students recognize social and philosophical implications of the scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.**

The field of pharmacology is rife with controversy, from provocative applications of new therapies to the public's distrust of drug development and clinical trials. These non-medical arguments heavily impact medical progress in both positive and negative ways, and therefore critical science evaluation skill development will be an important focus of the class (as evidenced by objective #6).

### **B. How do the readings assigned address the GE category expected learning outcomes?**

In order to stimulate discussion in-class and out, readings will be assigned for approximately 25% of the lecture topics. These will be used almost entirely to touch on controversial elements of the disease



treatments, thereby supporting the GE outcome to “recognize social and philosophical implications of the scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.”

**C. How do the topics address the GE category expected learning outcomes?**

My own research has shown that pharmacology is an excellent platform by which to teach and reinforce learning of basic science principles (Kwiek, NC et al, *Science*, 2007). All course topics, including the principles, select disease examples, and future therapeutic frontiers, are relevant, contemporary, and engaging to students. Additionally, the entire course, even the controversial implications, is rooted in basic science. This compelling scientific content will help to facilitate achievement of all learning outcomes, both course- and GE category-specific.

**D. How do the written assignments address the GE category expected learning outcomes?**

There are no formal written assignments.

**E. How do the prerequisites provide an appropriate level of preparation for the proposed course? If there are no prerequisites, please indicate how this is consistent with the proposed level of the course.**

There are no prerequisites for this class as the material is easily adaptable with proper teaching. I have taught elements of this course to pre-college students (through my summer high school program, “Pills, Potions, and Poisons”) and to learners of all backgrounds worldwide (through a massive open online course last fall). This class is intended to enhance students’ broad understanding of drug action and particularly to build critical thinking skills about drug topics. This can be effectively accomplished without significant preparatory coursework.

**F. If the course is being proposed to fulfill the requirement for a course with a laboratory, please answer the following question: what type(s) of experiences will students have in the laboratory component of the course?**

N/A

## **GE Assessment Plan for PHR2010, Pharmacology: The Science Behind Drugs**

### **A. Description of the specific methods the faculty will use to demonstrate that the aggregate of his/her students are achieving the goals and expected learning outcomes of this GE category**

Student learning goals will be assessed by both direct and indirect measures. Regarding the former, I will use embedded exam questions. Learning of all of the course-specific and GE category-specific outcomes will be able to be objectively evaluated in this manner and will provide the best data regarding learning of scientific principles.

Additionally, I plan to use the National Science Foundation-supported Student Assessment of their Learning Gains (SALG) instrument to indirectly measure student learning. This valid, reliable, and customizable survey instrument questions students about their learning of the stated goals of the course as well as their impression of implemented pedagogical techniques (Carroll SB, Science Education and Civic Engagement: The SENCER Approach, 2010). As such, students will get the opportunity to be metacognitive, reflecting on what they learned in the class and what helped (or didn't help) them learn. I will solicit SALG evaluation at the beginning and end of the course so as to provide pre- and post-instructional data.

### **B. Explanation of the level of the student achievement expected**

In the first years of teaching this course, I expect that at least 75% of students will correctly answer the embedded exam questions. With regards to the post-course SALG instrument, I expect that each item score will average at least 3.75 on a 5-point scale and that significant gains from the pre-test will be observed. Both of these scores are consistent with a 'C'-grade and will serve as a starting point for course improvement in subsequent years. (See below)

### **C. Description of follow-up/feedback process**

The assessment data will drive course adaptation and teaching over subsequent years. If embedded question data suggest that too few students are meeting the minimum standard, then alternative approaches (e.g., different teaching tactics, more time, supplemental resources to reinforce learning) will be implemented. If significantly more than 75% of the students are answering the questions correctly, then the rigor of and the time allotted to the specific content will be modified. I will utilize the SALG instrument data to assemble the most effective course tools, teaching techniques, and class elements for future course offerings.