Course Submission Form

Instructions: All courses submitted for the Common Core must be liberal arts courses. Courses submitted to the Course Review Committee may be submitted for only one area of the Common Core and must be 3 credits/3 contact hours. Colleges may submit courses to the Course Review Committee before or after they receive college approval. STEM waiver courses do not need to be approved by the Course Review Committee. This form should not be used for STEM waiver courses.

<table>
<thead>
<tr>
<th>Form ID</th>
<th>CCOREFORM1086345922001</th>
<th>Version No.</th>
<th>21.001</th>
<th>Created by</th>
<th>Ashton, William A</th>
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<tr>
<td>Current Status</td>
<td>Approved</td>
<td>Course Selected:</td>
<td>Subject PHS (Pharmaceutical Science)</td>
<td>Catalog Nbr</td>
<td>110</td>
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Course Revision & College

| Form Submission | Initial Submission | College | York College |

Course Data

| Course ID | 127122 | Subject | PHS (Pharmaceutical Science) | Catalog Nbr | 110 |
| Catalog Status | Pending | Contact Hours | 3 | No. of Credits | 3 |
| Course Title | Medicine and Drugs of Abuse |
| Course Description | The history, biochemistry, pharmacology and societal impact of major categories of medicines and drugs. Includes a laboratory component. |
| Department | Chemistry |
| Pre-Requisites/Co-Requisites |

Course Syllabus [Attachment Filename(s)]

Pharm_Science_110_-_Course_syllabus.pdf

Location (Required or Flexible) and Learning Outcomes

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>FLEXIBLE</th>
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<tbody>
<tr>
<td>English Composition</td>
<td>World Cultures &amp; Global Issues</td>
</tr>
<tr>
<td>Math &amp; Quantitative Reasoning</td>
<td>US Experience in its Diversity</td>
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<tr>
<td>☑ Life and Physical Sciences</td>
<td>Creative Expression</td>
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<tr>
<td>Learning Outcomes: Questions</td>
<td>Learning Outcomes: Responses</td>
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<tr>
<td>* 1. Identify and apply the fundamental concepts and methods of a life or physical science.</td>
<td>Readings, lectures and guided inquiry will identify fundamental concepts of ligand-substrate interaction, drug mechanisms, and the structural basis of biochemical function. Concepts learned will be applied to the exploration of specific drug classes.</td>
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<td>* 2. Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation.</td>
<td>Guided inquiry studies based on the fundamental concepts discussed above, will apply principles of the scientific method to explore how specific drugs work in the body. Laboratory activities, such as experimentation on the effect of antibiotics on bacterial growth; vaccine simulation; determination of the active ingredients in anaglesics; and computer drug/receptor docking; will apply the scientific method to explore interactions between drugs and their targets through hypothesis development, observation, experimentation and measurement, data analysis and presentation. Students will develop hypothesis, plan and perform experiments and measurements, analyze their own data, and present their results in reports and group presentations.</td>
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<tr>
<td>* 3. Use the tools of a scientific discipline to carry out collaborative laboratory investigations.</td>
<td>The aforementioned laboratory experiments will be collaborative. Students will be trained with specific tools and methods, such as titration, computational analysis and simulations, and then work in groups of 2-4 to plan, carry out, assess and present their laboratory investigations.</td>
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<td>* 4. Gather, analyze, and interpret data and present it in an effective written laboratory or field work report.</td>
<td>The aforementioned laboratory experiments will involve gathering data through experimentation and measurements, and presentation in written laboratory reports, including abstract, introduction, procedure, results, discussion and conclusion.</td>
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<td>* 5. Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data.</td>
<td>Scientific ethics are an important component of this class. In addition to an examination of societal ethics of medicines and drugs, research ethics will also be taught as part of the laboratory experiment. Laboratory notebooks will be kept in accordance with Good Laboratory Practice standards, and different types of biases will be examined with a view towards prevention during data gathering and assessment.</td>
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A. If there is a change to the course title, what is the new course title?
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<th>B. If there is a change to the course description, what is the new course description?</th>
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<tr>
<td>C. If there is a change to the pre-requisites and/or co-requisites, what are the new pre-requisites and/or co-requisites?</td>
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Rationale

There is currently no Pathways-eligible course in the Department of Chemistry, which includes Pharmaceutical Science. This course will fulfill the Science requirement for Pathways-based general education. Drugs, both good and ill, are an essential component of modern society. This course will provide students with a general foundation that will enable them to understand, contextualize, and make educated decisions with regard to both pharmaceutical and recreational drugs.
Pharmaceutical Science 110. Medicines and Drugs of Abuse
3 credits. 3 course hours/week.
York College/City University of New York
Department of Chemistry

Course description. General-education introduction to the history, biochemistry, pharmacology and societal impact of major categories of medicines and drugs. Includes a laboratory component.

Learning Objectives. By the end of this course, students should be able to:
1. Identify fundamental concepts of ligand-substrate interaction, drug mechanisms, and the structural basis of biochemical function; apply these concepts to novel classes of compounds
2. Apply basic concepts and the scientific method to explore interactions between drugs and their targets
3. Carry out basic experimental and computational analysis of drug compounds, and gather, analyze, interpret and present data from such analyses
4. Contextualize important drugs within a historical and social context, and evaluate drug-related ethical and societal issues
5. Make informed decisions related to the use of pharmaceutical and recreational drugs.

Textbooks.

Grading. Final grade will be determined as follows:
- 25% Lab reports
- 40% Two lecture exams
- 5% BlackBoard course discussion.
- 20% Final exam
- 10% Term paper

Course outline.

Week 1. Antibiotics
Laboratory Experience #1 - Effect of antibiotics on bacterial growth
Week 2. Antivirals and AIDS medications. (Ethics and social impact: AIDS in sub-Saharan Africa)
Week 3. Cold and flu medications, antihistamines
Laboratory Experience #2 - Preparation of lip balm
Week 4. Hypertensives (Ethics and social impact: Cost of prevention vs therapy)
Week 5. Diabetes and obesity
Exam 1. Coverage: Material from weeks 1 - 4
Week 6. Vaccines. (Ethics and social impact: The anti-vaccination campaign)
Week 7. Cancer Chemotherapeutics
Laboratory Experience #3 - Determination of active components in analgesics
Week 8. Birth control, sex aids, and hormone replacement therapy, (Ethics and social impact: Distribution of resources in drug discovery)
Week 9. Psychiatric medications and hallucinogens
Laboratory Experience #4 - Computer vaccination simulation
Week 10. Painkillers
Exam 2 - Coverage: Material from weeks 5 - 9
Week 11. Alcohol and tobacco (Ethics and social impact: The high societal cost of alcohol abuse)
Week 12. Cocaine, heroin and LSD
Week 13. Marijuana. (Ethics and social impact: Medical marijuana)
Week 14. Performance enhancing drugs.
Laboratory Experience #5 - Drugs and receptors docking study
Term Paper due.
Final Exam. Coverage: Material from weeks 10 - 14
**Term Paper.** A 4-6 page paper that covers the history, biochemistry and pharmacology, and societal impact of one particular drug or class of drugs will be developed over the course of the semester. A topic will be submitted for approval week 6, an outline and annotated bibliography week 10. A rough draft may be submitted for comments (but will not be graded) up to week 13. Term paper is due on the first day of Final Examination period. Assignments handed in late will lose 5% credit per day.

**Readings and BlackBoard course discussion.** Readings are required and will be discussed using BlackBoard. Responses on at least 10 of the 14 topics are required and will be graded. If additional responses are done, the best 10 will be counted.

**Exams.** Two lecture exams, and one final exam will be given. Each exam will consist of multiple choice questions that are mainly recall, and two short essays. One essay will focus on explaining biochemistry and/or pharmacology, and the other on addressing social and ethical implications. No make-up exams will be given without prior approval.

**Lab Reports.** Each of the 5 laboratory experiences will have a worksheet that serves as a lab report, due the class one week following the lab. Assignments handed in late will lose 5% credit per day.

**Policy on academic integrity.** Violation of the standards of academic integrity will result in the automatic failure of the class. Note that violations of academic integrity include but are not limited to cheating and plagiarizing, such as using uncited sources, copying without quotation, and using someone else’s (present or former student) text or spreadsheets. For a full description, please take see York College’s policy on academic integrity at: http://www.york.cuny.edu/president/legal-compliance/legal-affairs/cuny-legal-policies-procedures/Academic-Integrity-Policy.pdf/

**Policy on lab safety, responsible conduct in the lab and preparation.** YOU MUST READ THE LAB HANDBOOKS AHEAD OF TIME. If you come to class without reading the lab handouts, you are wasting your time, your partners’ time, and the instructors’ time. If you are not prepared, you will not be allowed to participate in lab, and your grade for all the assignments associated with this lab will be zero. No make-up labs for this reason will be given.

**Policy on accommodations for disabled students.** Information about the services provided to students at York College can be found at the Office of Services for Students with Disabilities, in room AC-1G02, and on-line at: http://york.cuny.edu/student-development/ossd
1. **Effect of antibiotics on bacterial growth.** The goal of this experiment is to explore how different antibiotics affect the propagation of *E. coli*. In this way, concepts target specificity can be illustrated. A non-virulent strain of *E. coli* will be used for safety reasons. Students will have access to drugs from different categories: broad-spectrum, Gram positive-specific and Gram negative-specific anti-bacterial, and anti-fungal, and be asked to hypothesize which of them will inhibit the growth of *E. coli* (a gram negative bacterium). They will then test their hypothesis by preparing agar plates with growth medium infused with the different drugs, plating a starter culture of *E. coli*, and observing growth rates by counting colonies after several days of growth. Dose-response curves will be constructed by comparing colony counts to concentration of drug, and replicate results from the class will be used to implement data analysis concepts of mean standard deviation, and correlation.

2. **Preparation of lip balm.** The goal of this experiment is to give non-experts with little lab training a hands-on experience of compounding, or physically making, a drug. This is a standard laboratory experience for pharmacy and pharmaceutical technology students. Lip balm base is made from lipidic substances, and students will form hypothesis about physical properties of lipids, predicting which type of lipids (saturated or unsaturated) will make a sturdy solid lip balm base, before infusing it with simple and safe substances such as menthol.

3. **Determination of active compounds in analgesics.** Students will apply methods of analysis (titration, chromatography) to the separation and quantification of the active ingredients in commercially-obtained Excedrin (aspirin, acetaminophen, and caffeine). They will form hypotheses about the purity of the compounds, and the accuracy of the label, evaluate them experimentally and statistically, and draw conclusions.

4. **Computer vaccination simulation.** Students will study how the percent coverage of a population by vaccination affects the spread of disease using computer simulations. Hypotheses will be formed regarding the effect of different model parameters, that represent factors such as: transmissibility of the disease; effectiveness of the vaccine; and the time frame where the disease is contagious will be varied.

5. **Drug and receptor docking studies.** Structure-activity relationships will be explored using computer modeling software. Students will form hypotheses about the role of specific chemical functional groups in binding affinity to a protein receptor, and evaluate them using molecular modeling.