

**BHP271: Idea to Innovation**  
*Tentative syllabus*

**Professors:**

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**Course Description:**

The pharmaceutical industry comprises an incredibly diverse team of thinkers, including accountants and biochemists, who are all on a quest to improve human health. The development of medical treatments relies on pivotal insights from the scientific laboratory, but turning these ideas into practical medical innovations requires the solving of many problems outside of the scientific field. Through the examination of historical and contemporary case studies, this course will investigate the nature of science as it is practiced in the real world. How are problems identified and ideas generated and refined? What political and sociological challenges does the industry encounter? Who pays for all of this? By exploring growth in the pharmaceutical industry from the inside, students in this class will gain a deeper understanding of both science and business and how these disciplines interact in order to enhance and extend human life.

This course fulfills a CLAS general education natural sciences requirement.

**Course Objectives:**

By the end of this course, students will be able to:

1. Define the scientific method and explain how it has been applied to understand and develop treatments for human diseases.
2. Explain the broad structure of the pharmaceutical industry and describe key functions of various pharmaceutical corporations.
3. Analyze basic biochemical pathways and explain how alterations can impact physiology in negative or positive ways.
4. Identify social, political, and economic problems that constrain the use of potential medical therapies and explain how the business community addresses these issues.
5. Synthesize scientific and business principles to analyze significant issues relating to the pharmaceutical and healthcare industries in the U.S. and globally.

## Methods of Evaluation:

Students will be expected to attend class regularly, to prepare for class appropriately, and to engage in discussions and other in-class activities. Student understanding in each of the content will be assessed by at least one quiz; quizzes will cover reading and discussion material and will include problem-solving and short-answer questions. A total of twelve Canvas Responses will assess students' deep understanding of weekly readings and discussions (the lowest two scores on these responses will be dropped). More detail concerning the term project and the oral presentation can be found below and on the course's Canvas site.

Quizzes (4 at 5% each):	20%
Term paper:	35%
5% Annotated Bibliography	
5% Outline	
5% Rough Draft	
20% Final Draft	
Oral Presentation:	15%
Canvas Responses (10 at 2% each):	20%
Participation:	10%

### Term paper and presentation:

In this course, we will examine several case studies that trace a type of medicine from inception to delivery. Through these case studies, we will explore problems that are encountered by the scientific and business communities and the tools that pharmaceutical companies use to overcome these problems. For your term assignment, you will choose a societal issue of relevance to the pharmaceutical and healthcare industries and will explore this issue utilizing and developing your understanding of basic scientific and business principles. Examples of problems that you may address include the cost of medicines, disparities in healthcare outcomes, addiction, orphan diseases, and antibiotic resistance.

Your goal is not simply to explain a topic but to develop and support an argument, which will help illuminate the roles that science and business will play in solutions to your problem of interest. In pursuing your own research, you will be required to reference at least four scholarly, peer-reviewed sources AND at least two "serious," though not necessarily scholarly, sources (these include reports from reputable news outlets such as *The New York Times*). To assist with the collection of sources, you will be required to complete an annotated bibliography encompassing at least ten articles. Details of the preliminary assignments (annotated bibliography, outline, and rough draft) are available on Canvas and will be discussed further in class.

You will demonstrate your mastery of your topic in two different but related ways: an oral presentation (10-12 minutes) and a final paper (12-15 pages). More information will be provided concerning these two assignments. But note that the oral presentation will require you to utilize appropriate evidence, including visual and/or multimedia aids, to convince the class of your assertion. Presenting in this way

will allow the class, and your professors, to challenge your claims (in a respectful way). This assignment will help you to hone your presentation skills and may help to shape your written argument.

**Canvas Responses:**

Each week, you will be assigned at least one reading via Canvas. Examples of readings that might be assigned are in the tentative class schedule. We expect that you will actively read this assignment and come to class prepared to discuss and learn more about the relevant issues.

In addition, you will be asked to submit, via Canvas, a written “response” to each of the twelve readings, to be due at midnight on the Thursday *following* class (e.g. the response to the reading for Tuesday, March 3<sup>rd</sup> will be due by the end of Thursday, March 5). The prompts for these responses will typically ask you to summarize the key arguments or issues covered in the readings and to apply some analysis of your own.

Since you will have other things to do to prepare for the following class (e.g. perform the *next* reading assignment), we will be fairly strict with the deadlines for the Canvas responses. For each calendar day late, 25% will be deducted from your score.

On the other hand, we will also drop your two lowest response grades (even if they are zeroes). To be clear, there will be twelve response assignments, but we will only count the best ten scores.

**Class Policies:**

**Communications:** We strongly encourage you to engage with us between class meetings. We can help you to understand readings, to work through Canvas responses, or to find resources for your papers, for example. Our preferred means of communication is through email. Additionally, *please send any email correspondence to both professors.*

**Attendance:** As the semester is fleeting and the course meets only weekly, we expect full attendance. If absences cannot be avoided, students must communicate with the professors early so that alternative exercises can be provided. Students will be responsible for all weekly work, including quizzes and Canvas responses, even in the event of an unavoidable class absence.

**Use of technology:** In the interest of respectful, engaging discussions, the use of technology (e.g. computers and cell phones) is typically prohibited. In rare cases, cell phones or laptops can be used in the pursuit of course goals (e.g. to access information required to flesh out discussions).

**Academic honesty:** We trust that you are adults of the utmost integrity; however, any academic honesty violation that is uncovered will be dealt with swiftly and strictly. At the very least, a first incident will result in a zero for an exam, quiz, or assignment. Any subsequent incidents will result in a failing grade for the entire course.

**Students with disabilities:** If feel that you need academic accommodations in this course, please make an appointment with Student Accessibility and Support Services in the Vona Academic Annex, Room 8. The phone number is (609) 895-5492, and the email is [accessibility@rider.edu](mailto:accessibility@rider.edu).

*Tentative class schedule*

Week	Section	Topic	Due	Example Readings
1	<b>I. Introduction</b>	Introduction 1: Exploring the scientific method in its application to the pharmaceutical industry.		<i>Feynman</i> : The Value of Science <i>Hara</i> : Technological Change in the Pharmaceutical Industry
2		Introduction 2: Exploring business strategy in the context of applied science.		<i>Porter</i> : How Competitive Forces Shape Strategy
3		Introduction 3: The nature of creativity in the business of science.	Quiz 1	<i>Hara</i> : The Process of Drug Discovery and Development
4	<b>II. Metabolic Diseases</b>	How our bodies sense and respond to food: scientific and commercial considerations in diabetes and other metabolic diseases.	Topic Proposal	<i>Baylis and Starling</i> : The Mechanism of Pancreatic Secretion (from <i>The Discoveries</i> by Lightman)
5		Insulin: speed bumps on the road to a treatment for diabetes.		<i>Vecchio et al.</i> : The Discovery of Insulin: An Important Milestone in the History of Medicine
6	<b>III. Infectious Diseases</b>	The response of the business community to the germ theory of disease and the demand for antibiotics.	Annotated Biblio	<i>Fleming</i> : On the Antibacterial Action of Cultures of a Penicillium <i>Quinn</i> : Rethinking Antibiotic R & D – WW2 and the Penicillin Collaborative
7		Scientific and commercial considerations and the problem of antibiotic resistance.	Quiz 2	<i>Silver</i> : Discovery and Development of New Antibiotics – The Problem of Antibiotic Resistance <i>Sciaretta</i> : Economic Incentives for Antimicrobial Therapy Development

8	<b>IV. Cardio-vascular Disease</b>	The blood and oxygen as a finely-tuned system and as a source of opportunity for pharmaceutical companies.	Outline	<i>Hara</i> : Cardiovascular Drugs <i>Shelley</i> : A Pitched Battle in Cardiovascular Drug Marketing
9		The story of statins: the targeting and marketing of cholesterol.	Quiz 3	<i>Roth</i> : The Discovery and Development of Atorvastatin, a Potent Novel Hypolipidemic Agent
10	<b>V. Cancer</b>	The roots of cancer: understanding etiology leads to identification of pharmaceutical targets.		<i>Modrich</i> : Nobel Lecture – Mechanisms in DNA Mismatch Repair
11		Developing biologics and immunological tools toward the modernization of the war on cancer.	Rough Draft	<i>Mukherjee</i> : The Promise and Price of Cellular Therapies <i>Haydon</i> : Biologics -- The Pricey Drugs Transforming Medicine
12	<b>VI. Student Work</b>	What broad problems does the pharmaceutical industry face? How can science and business address them?	Presentations	
13	<b>V. Conclusions</b>	Strategic insights into the future of healthcare	Quiz 4	