

April 20, 2010

**Proposal for a BSc (Honours) Pharmacology  
Program (Regular and Co-Op) in the Faculty of Science**

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## Executive Summary

The Faculty of Science proposes a new Honours BSc program in Pharmacology. It makes extensive use of courses in the existing Biological Science, Chemistry and other Science programs, and requires only 7 new courses out of the total of 40 courses in the program (indicated in red on the Program Map). We propose to offer the program in both Regular and Co-Op formats, the latter according to the standard 1-3-1 pattern used for Science Co-op programs; the Program Map in this document shows only the Regular format.

The program content is similar to existing pharmacology programs at the University of Western Ontario and the University of Toronto; these are the only other undergraduate pharmacology programs in Ontario of which we are aware. It is proposed to make the program available for students to enter in September 2011.

The proposed program provides a basic grounding in biological and chemical science, with an emphasis on study of the fate of drugs in the human body. It provides an attractive science-based program for students wishing to proceed to post-degree studies in an area of medical science. The proposed program complements and enhances other programs and faculty research interests in the Faculty of Science. It provides an alternative pathway of study between the emphases of the existing Pharmaceutical Chemistry and the Life Sciences programs. It differs fundamentally from the former, which is a broad-based chemistry program that with a specialization related to the drug development process. It differs from and complements the latter, which is a comprehensive human biology program. At the research level, the program complements the existing Faculty of Science emphasis on molecular biology and biological chemistry, and we believe that the existence of this undergraduate program and its faculty members would attract additional students to the Applied Bioscience graduate program. The program would also strengthen the argument for the eventual establishment of a medical school at UOIT.

We believe that the program would be successful in attracting net additional new students to UOIT. Over 10% of the BSc Faculty of Science graduates in the first 2 cohorts entered medical schools. We believe that appropriate marketing of this new program that emphasized this fact would lead to increased enrolments, and that the program would be attractive to students interested in entering medical school, or in pursuing opportunities in the pharmaceutical sector.

The Business Plan shows 2 enrolment scenarios, using very conservative attrition estimates. One forecasts a minimal net enrolment (accounting for any decrease in the Life Sciences program) of 20 students in September 2011, rising to 35 in September 2013. The other forecasts a moderate net enrolment of 30 students in September 2011, rising to 50 in September 2013.

### **Resources required:**

- The attached Business Plan shows the ongoing income and expenditures required for the program delivery. Efficiencies are inherent due to the bulk of the courses being already available in other programs. A total of 7 new courses are required for the program, as well as the addition of a laboratory to an existing lecture-only course which currently does not have one.
- 2 additional core faculty members in pharmacology are required, to deliver the 7 specialized courses in years 3 and 4 of the program, and to provide research-oriented faculty related to the program. These faculty members would teach in the program and participate in the Applied Bioscience MSc and PhD graduate programs. If the first Pharmacology program intake is in September 2011, one would ideally be hired by July 2012 and the other in July 2013. This would give the faculty members sufficient preparation time a year in advance of students entering the upper If necessary, both hirings could be delayed by a year.
- Additional laboratory space is needed to accommodate the anticipated increased enrolments in the general biology and chemistry courses of the first 2 program years. Increased space needs are already present due to the existing Science program enrolments, due in part to their 40% year-over-year increased intake in September 2009, and these are being addressed. The needs can be accommodated by retrofitting space in the east wing of the Science building, or by another means.
- A new animal laboratory facility is required for an upper year laboratory course in the program and to provide additional laboratories to accommodate the research needs of the new faculty members. The facility to accommodate the needs of the Mammalian Physiology laboratory is required in Semester 5 of the program, which would be July 2014. This will also entail the need for additional laboratory technologist personnel resources. The need for an animal laboratory facility has already been recognized as a future requirement for the research programs of several existing faculty members in Science and in Health Sciences, and discussions have begun with the goal of accommodating this need at an off-site facility. The research lab facility would ideally be in place by July 2013.

UOIT Honours BSc Pharmacology Program Map				
L=Lab, T=Tutorial, B=Bi-weekly				
Red indicates new course, others are existing courses				
SEMESTER 1			LEC	LAB/TUT
BIOL 1010U	Biology I - Molecular and Cellular Systems	3	3LB, 1.5TB	
CHEM 1010U	Chemistry I	3	3LB, 1.5TB	
CSCI 1000U	Scientific Computing Tools	3	1.5T	
MATH 1010U	Calculus I (or MATH 1000U*)	3	1.5T	
PHY 1010U	Physics I (or PHY 1030U*)	3	3LB, 1.5TB	
SEMESTER 2				
BIOL 1020U	Biology II - Diversity of Life/Principles of Ecology	3	3LB,1.5TB	
CHEM 1020U	Chemistry II	3	3LB,1.5TB	
MATH 1020U	Calculus II	3	1.5T	
PHY 1040U	Physics for Biosciences	3	3LB,1.5TB	
PSYC 1000U	Introductory Psychology	3	0	
SEMESTER 3				
BIOL 2010U	Introductory Physiology	3	3LB,1.5TB	
BIOL 2030U	Cell Biology	3	3LB,1.5TB	
CHEM 2020U	Introduction to Organic Chemistry	3	4LB	
STAT 2020U	Statistics & Probability for Biological Science	3	1.5T	
	Elective			
SEMESTER 4				
BIOL 2020U	Genetics and Molecular Biology	3	3LB,1.5TB	
BIOL 2040U	Biochemistry	3	1T	
BIOL 2050U	Human Anatomy	3	3LB	
CHEM 2120U	Organic Chemistry	3	4L	
	Elective	3		
SEMESTER 5				
PHRM3010U	Introductory Pharmacology and Toxicology (Lecture section coincides with BIOL3020U)	3	3L	
CHEM3140U	Physical Chemistry for Biosciences	3	0	
BIOL3070U	Mammalian Physiology	3	4L	
	Elective			
	Elective			
SEMESTER 6				
PHRM3020	Systems Pharmacology	3	0	
PHRM3030	Molecular Mechanisms of Drug Action	3	0	
PHRM3040	Gene Expression Pathways in Pharmacology	3	0	
BIOL3060U	Introductory Neuroscience	3	0	
	Elective			
SEMESTER 7				
PHRM4010	Molecular Toxicology (Cross-listed with FSCI4030U, Drug Chemistry and Toxicology)	3	4L	
PHRM4020	Neuropharmacology	3	0	
One of	PHARM 4410U - Pharmacology Thesis Project I**			
	or PHARM 4430U - Directed Studies in Pharmacology***			
	or elective			
	Elective or Senior Pharmacology Elective			



**NEW COURSE TEMPLATE**

*For changes to existing courses see Course Change Template*

<b>Faculty:</b> Science		
<b>Course title:</b> Introductory Pharmacology and Toxicology		
<b>Course number:</b> PHRM 3010U	<b>Cross-listings:</b> BIOL3020U (lecture section)	<b>X Core</b> ___ <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 4; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

An overview of the action and toxicity of drugs that affect the autonomic nervous system, the central nervous system, and cardiovascular function in both normal and pathological conditions. Toxicological effects of food, food additives, household and industrial products and wastes will also be examined.

<b>Prerequisites</b>	BIOL2010U, BIOL2040U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	BIOL3020U, NURS2810U
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

At the completion of this course the student will have a basic foundation in drug chemistry and toxicological theory and will have gained an understanding of the application of this knowledge in the laboratory.

**DELIVERY MODE**

3 hrs of lecture per week and a 4-hour weekly laboratory

**TEACHING AND ASSESSMENT METHODS**

Assessment will consist of midterm(s), assignments, laboratory reports and a final examination.

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

See Pharmacology program proposal to 28 April 2010 CPRC meeting

**APPROVAL DATES**

Date of submission	
Curriculum Committee approval	
Faculty Council approval	14 April 2010

**NEW COURSE TEMPLATE**

*For changes to existing courses see Course ChangeTemplate*

<b>Faculty:</b> Science		
<b>Course title:</b> Mammalian Physiology		
<b>Course number:</b> BIOL3070U	<b>Cross-listings:</b>	<b>X Core</b> <input type="checkbox"/> <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 4; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

This course covers the physiology of the major mammalian organ systems. Topics include respiratory, cardiovascular, gastrointestinal, renal physiology, neurophysiology, endocrinology and reproductive physiology.

<b>Prerequisites</b>	BIOL2010U; BIOL2040U; STAT2020U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	BIOL3040U
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

The general theme of this course is how homeostasis is maintained by coordination of the major organ systems in mammals. Students who have completed this course will have knowledge of the function and regulation of all the major mammalian systems. Students will also have a clear understanding of the relationship between structure and function and how it applies to the nervous, circulatory, respiratory, excretory and digestive systems. In the laboratory, students will gain valuable experience in the use of equipment used in the physiology laboratory which might include cathode-ray oscilloscopes, polygraphs, electronic simulators, and electronic amplifiers and transducers.

**DELIVERY MODE**

3 hrs of lecture per week and a 4-hour weekly laboratory

**TEACHING AND ASSESSMENT METHODS**

Assessment will consist of midterm(s), assignments, laboratory reports and a final examination.

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

See Pharmacology program proposal to 28 April 2010 CPRC meeting

**APPROVAL DATES**

Date of submission	
Curriculum Committee approval	
Faculty Council approval	14 April 2010

**NEW COURSE TEMPLATE**

*For changes to existing courses see Course Change Template*

<b>Faculty:</b> Science		
<b>Course title:</b> Systems Pharmacology		
<b>Course number:</b> PHRM3020U	<b>Cross-listings:</b>	<b>X Core</b> ___ <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 0; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

This course will examine the effects of drugs and other mediators on the major organ systems in the body, including the cardiovascular, gastrointestinal, reproductive and endocrine systems. This examination will outline the effects of drugs at the tissue, cellular and molecular levels.

<b>Prerequisites</b>	BIOL2020U, BIOL3070U, PHRM3010U, CHEM3140U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	None
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

Demonstrate the ability to:

1. Understand the mode of action of different drugs that target the body's major organ systems
2. Understand the major human conditions that are related to our organ systems and how different therapeutics treat these conditions.
3. Understand the mode of action of various drugs at the tissue and cellular level
4. Describe potential side effects of these drugs
5. Analyze and interpret experimental and clinical data related to drugs that treat the major organ systems.

**DELIVERY MODE**

3 hrs of lecture per week

**TEACHING AND ASSESSMENT METHODS**

Assessment will consist of midterm(s), assignments and a final examination.

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

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**APPROVAL DATES**

Date of submission	
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**NEW COURSE TEMPLATE**

*For changes to existing courses see Course Change Template*

<b>Faculty:</b> Science		
<b>Course title:</b> Molecular Mechanisms of Drug Action		
<b>Course number:</b> PHRM 3030U	<b>Cross-listings:</b>	<b>X Core</b> <input type="checkbox"/> <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 0; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

This course will examine the effect and actions of drugs at the molecular level. This will include a comprehensive overview of receptor/drug analysis and theory, predictions of drug action using molecular modeling, molecular and genetic tools for the understanding of the action of drugs and an examination of the structure-function of receptors and other proteins and how it relates to drug action.

<b>Prerequisites</b>	BIOL2020U, BIOL3070U, CHEM3140U, PHRM3010U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	None
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

Demonstrate the ability to:

1. Understand the use of drug binding analysis to characterize drug/receptor interaction
2. Understand the methods for characterizing pharmacological receptors
3. Understand and use computer tools to analyze and predict receptor/drug binding including molecular modeling
4. Understand the use of molecular biology and genetic tools to investigate the action of drugs
5. Be able to describe how the structure of receptors/proteins is related to drug action

**DELIVERY MODE**

3 hrs of lecture per week

**TEACHING AND ASSESSMENT METHODS**

Assessment will consist of midterm(s), assignments and a final examination.

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

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**APPROVAL DATES**

Date of submission	
Curriculum Committee approval	
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**NEW COURSE TEMPLATE**

*For changes to existing courses see Course Change Template*

<b>Faculty:</b> Science		
<b>Course title:</b> Gene Expression Pathways in Pharmacology		
<b>Course number:</b> PHRM 3040U	<b>Cross-listings:</b>	<b>X Core</b> ___ <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 0; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

This course explores how drugs and endogenous compounds mediate their biological effects through nuclear signalling pathways. The emphasis will be on aspects of gene regulation and signalling by nuclear hormone receptors – a family of ligand-dependent transcription factors essential for normal metabolism, development and reproduction.

<b>Prerequisites</b>	BIOL 2020U, BIOL3070U, CHEM 2120U, PHRM3010U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	None
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

The student will understand how various drugs and compounds are able to mediate their effects through various nuclear signaling pathways.

**DELIVERY MODE**

3 hrs of lecture per week

**TEACHING AND ASSESSMENT METHODS**

Assessment will consist of midterm(s), assignments and a final examination.

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

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## NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

<b>Faculty:</b> Science		
<b>Course title:</b> Molecular Toxicology		
<b>Course number:</b> PHRM 4010U	<b>Cross-listings:</b> FSCI4030U (lecture section)	<b>X Core</b> ___ <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 4; Tutorial: 0; Other: 0	

### CALENDAR DESCRIPTION

This course will compare the roles of a drug chemist and toxicologist, including the analysis of drug samples, and drugs/metabolites in biological samples. Students will be exposed throughout the course to critical thinking that may be required in potential drug chemistry and molecular toxicology case scenarios. The lecture portion will cover topics including: principles of drug chemistry, analytical chemistry, the study of selected analyte drug classes and selected therapeutic drug classes, as well as molecular toxicology. Students will have the opportunity to apply the theory and knowledge gained through the lectures, during a series of intensive laboratory experiments relating to drug chemistry and toxicology.

<b>Prerequisites</b>	PHRM3010U, PHRM3020U, PHRM3030U, PHRM3040U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	FSCI4030U
<b>Credit exemptions</b>	None

### LEARNING OUTCOMES

At the completion of this course the student will have a strong foundation in drug chemistry and toxicological theory and will have gained an understanding of the application of this knowledge to molecular toxicology scenarios in the laboratory.

### DELIVERY MODE

3 hrs of lecture per week and a 4-hour weekly laboratory

### TEACHING AND ASSESSMENT METHODS

Assessment will consist of midterm(s), assignments, laboratory reports and a final examination.

### CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

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Date of submission	
Curriculum Committee approval	
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**NEW COURSE TEMPLATE**

*For changes to existing courses see Course Change Template*

<b>Faculty:</b> Science		
<b>Course title:</b> Neuropharmacology		
<b>Course number:</b> PHRM4020U	<b>Cross-listings:</b>	<b>X Core</b> <input type="checkbox"/> <b>Elective</b>
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 0; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

This course will focus on the cellular and molecular mechanisms underlying the actions of drugs on the central and peripheral nervous systems. The focus will be on recent developments in the field of neuroscience and their impact on our understanding of the actions, and development of, new drugs.

<b>Prerequisites</b>	BIOL3060, PHRM3010U, PHRM3020U, PHRM3030U, PHRM3040U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	None
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

- Demonstrate the ability to:
1. Understand neurotransmission within the peripheral and central nervous system
  2. Understand the key CNS disorders and their treatments
  3. Compare available treatments for specified disorders
  4. Describe the mechanism of action of specified neuropharmacological drugs
  5. Describe the non-therapeutic use of drugs and how they act on the CNS
  6. Critically evaluate neuropharmacological data

**DELIVERY MODE**

3 hrs of lecture per week

**TEACHING AND ASSESSMENT METHODS**

Assessment will consist of midterm(s), assignments and a final examination.

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

See Pharmacology program proposal to 28 April 2010 CPRC meeting

**APPROVAL DATES**

Date of submission	
Curriculum Committee approval	
Faculty Council approval	14 April 2010

## NEW COURSE TEMPLATE

For changes to existing courses see *Course ChangeTemplate*

<b>Faculty:</b> Science		
<b>Course title:</b> Cell Signaling in Pharmacology		
<b>Course number:</b> PHRM4030U	<b>Cross-listings:</b>	<input type="checkbox"/> Core <input checked="" type="checkbox"/> Elective
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 0; Tutorial: 0; Other: 0	

### CALENDAR DESCRIPTION

This course examines molecular mechanisms of drug interactions, with an emphasis on drugs that modulate cell signaling and cellular responses to drugs. The course will include student participation through presentation and discussion of relevant contemporary scientific literature. Topics include: cell cycle checkpoints and anti-cancer drugs, therapeutic control of ion channels, and blood glucose, nonsteroidal anti-inflammatory agents and arachidonic acid signaling, and molecular mechanisms of drug tolerance.

<b>Prerequisites</b>	PHRM3010U, PHRM3020U, PHRM3030U, PHRM3040U, BIOL2020U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	None
<b>Credit exemptions</b>	None

### LEARNING OUTCOMES

Students who have completed this course will have a clear understanding of the key concepts in cell signaling mechanisms and the major signaling pathways that convey cellular information. Students will also have an appreciation of the techniques and methods used to study these pathways and how drugs may be used to modulate them.

### DELIVERY MODE

3 hrs of lecture per week

### TEACHING AND ASSESSMENT METHODS

Assessment will include a combination of midterm and final examinations, assignments, term papers, class participation and an oral presentation

### CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

See Pharmacology program proposal to 28 April 2010 CPRC meeting

### APPROVAL DATES

Date of submission	
Curriculum Committee approval	
Faculty Council approval	14 April 2010

**NEW COURSE TEMPLATE**

*For changes to existing courses see Course Change Template*

<b>Faculty:</b> Science		
<b>Course title:</b> Mechanisms in Cancer Chemotherapy		
<b>Course number:</b> PHRM 4040U	<b>Cross-listings:</b>	<input type="checkbox"/> Core <input checked="" type="checkbox"/> Elective
<b>Credit weight:</b> 3	<b>Contact hours:</b> Lecture: 3; Lab: 0; Tutorial: 0; Other: 0	

**CALENDAR DESCRIPTION**

This course is designed to give students a basic understanding of the molecular pharmacology and therapeutic properties of anticancer agents. The focus is on molecular mechanisms of cancer chemotherapy, and will include drug resistance and the roles of receptor kinases and G protein-coupled receptors in existing and novel cancer therapies.

<b>Prerequisites</b>	BIOL 2040U, CHEM 2120U, PHRM3010U, PHRM3020U, PHRM3030U, PHRM3040U
<b>Co-requisites</b>	None
<b>Credit restrictions</b>	None
<b>Credit exemptions</b>	None

**LEARNING OUTCOMES**

The student will understand the properties and mechanisms of action of anticancer agents.

**DELIVERY MODE**

3 lecture hours per week

**TEACHING AND ASSESSMENT METHODS**

Assessment will include a combination of midterm and final examinations, assignments, term papers, class participation and an oral presentation

**CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE**

See Pharmacology program proposal to 28 April 2010 CPRC meeting

**APPROVAL DATES**

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Curriculum Committee approval	
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**Pharmacology Program Teaching Cost Model (BIU=1 in Year 1 and 2 in Upper Years), Scenario 1**

<b>BIU</b>	<b>5440</b>
<b>Formula Fee</b>	<b>2386</b>
<b>Net Grant Year 1 (BIU-FF)</b>	<b>3054</b>
<b>Net Grant Years 2-4 (2*BIU-FF)</b>	<b>8494</b>

<b>Tuition:</b>	
<b>First Year</b>	<b>5214</b>
<b>Second Year</b>	<b>5189</b>
<b>Third Year</b>	<b>5165</b>
<b>Fourth Year</b>	<b>5140</b>

		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Steady-state							
<b>Enrolment Projections (Bold represents Input Parameter)</b>							
Flow-through							
Year 1-2	<b>0.80</b>	<b>20</b>	<b>30</b>	<b>35</b>	<b>35</b>	<b>35</b>	<b>35</b>
Year 2-3	<b>0.90</b>		16	24	28	28	28
Year 3-4	<b>0.95</b>			14.4	22	25	25
Year 4					14	21	24
<b>Total</b>		20	46	73.4	99	109	112
<b>Revenue</b>		\$ 165,360	\$ 466,968	\$ 814,462	\$ 1,163,878	\$ 1,300,293	\$ 1,341,195
<b>Expenditures</b>							
<b>FT Faculty</b>	<b>#</b>						
Year 1 Shared Science	9	\$ 19,197	\$ 28,796	\$ 33,595	\$ 33,595	\$ 33,595	\$ 33,595
Year 1 Program	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 1 Electives	1	\$ 11,000	\$ 11,000	\$ 11,000	\$ 11,000	\$ 11,000	\$ 11,000
Year 2 Shared Science	8	\$ -	\$ 22,752	\$ 34,128	\$ 39,816	\$ 39,816	\$ 39,816
Year 2 Program	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 2 Electives	2	\$ -	\$ 22,000	\$ 22,000	\$ 22,000	\$ 22,000	\$ 22,000
Year 3 Shared Science	3	\$ -	\$ -	\$ 38,394	\$ 58,658	\$ 66,656	\$ 66,656
Year 3 Program	4	\$ -	\$ -	\$ 51,192	\$ 78,210	\$ 88,875	\$ 88,875
Year 3 Electives	3	\$ -	\$ -	\$ 33,000	\$ 33,000	\$ 33,000	\$ 33,000
Year 4 Shared Science	3	\$ -	\$ -	\$ -	\$ 37,328	\$ 55,991	\$ 63,990
Year 4 Program	4	\$ -	\$ -	\$ -	\$ 49,770	\$ 74,655	\$ 85,320
Year 4 Electives	3	\$ -	\$ -	\$ -	\$ 33,000	\$ 33,000	\$ 33,000
<b>Sub-Total</b>		\$ 30,197	\$ 84,548	\$ 223,309	\$ 396,376	\$ 458,588	\$ 477,252
<b>TA and Consumables Costs</b>							
Year 1 courses with labs	6	\$ 14,098	\$ 21,146	\$ 24,671	\$ 24,671	\$ 24,671	\$ 24,671
Year 1 courses with tutorials	9	\$ 13,598	\$ 20,396	\$ 23,796	\$ 23,796	\$ 23,796	\$ 23,796
Year 1 courses (lecture only, grading costs)	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 2 courses with labs	6	\$ -	\$ 11,278	\$ 16,917	\$ 19,737	\$ 19,737	\$ 19,737
Year 2 courses with tutorials	5	\$ -	\$ 6,043	\$ 9,065	\$ 10,576	\$ 10,576	\$ 10,576
Year 2 courses (lecture only, grading costs)	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 3 courses with labs	2	\$ -	\$ -	\$ 3,623	\$ 5,536	\$ 6,291	\$ 6,291
Year 3 courses with tutorials	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 3 courses (lecture only, grading costs)	5	\$ -	\$ -	\$ 93	\$ 142	\$ 162	\$ 162
Year 4 courses with labs	4	\$ -	\$ -	\$ -	\$ 6,696	\$ 10,043	\$ 11,478
Year 4 courses with tutorials	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 4 courses (lecture only, grading costs)	6	\$ -	\$ -	\$ -	\$ 109	\$ 163	\$ 186
<b>Sub-Total</b>		\$ 27,695	\$ 58,864	\$ 78,165	\$ 91,261	\$ 95,438	\$ 96,896
<b>Total</b>		\$ 57,892	\$ 143,411	\$ 301,474	\$ 487,637	\$ 554,026	\$ 574,148
<b>Gross Profit</b>		\$ 107,468	\$ 323,557	\$ 512,988	\$ 676,241	\$ 746,267	\$ 767,047
<b>Expenditures as % of Revenues</b>		35.0%	30.7%	37.0%	41.9%	42.6%	42.8%

Assumptions:

- One student = 1 FFTE
- No inflation factor is used
- Average salary for FT faculty member is \$90,000 plus 18.5% benefits
- Electives and Other Faculty courses at \$11,000 for each section of 50 students, including faculty and TA costs
- TA cost/hour (with 11% benefits) **38.85**
- Lab section size **24**
- Lab consumables cost/student/course **\$25**
- Tutorial section size **36**
- Average TA contact hours/lab section **70**
- Average TA contact hours/tutorial section **70**
- Average hrs/student grading (no tut or lab) **1.2**
- Shared courses fit into existing sections of size N; ascribe enrolment/N cost to courses (assume others will take as electives)
- Shared courses fit into existing sections of size N for Year 1 **250**
- Shared courses fit into existing sections of size N for Year 2 **150**
- Shared courses fit into existing sections of size N for Year 3 **30**
- Shared courses fit into existing sections of size N for Year 4 **30**

**Pharmacology Program Teaching Cost Model (BIU=1 in Year 1 and 2 in Upper Years), Scenario 1**

<b>BIU</b>	<b>5440</b>
<b>Formula Fee</b>	<b>2386</b>
<b>Net Grant Year 1 (BIU-FF)</b>	<b>3054</b>
<b>Net Grant Years 2-4 (2*BIU-FF)</b>	<b>8494</b>

<b>Tuition:</b>	
<b>First Year</b>	<b>5214</b>
<b>Second Year</b>	<b>5189</b>
<b>Third Year</b>	<b>5165</b>
<b>Fourth Year</b>	<b>5140</b>

		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Steady-state							
<b>Enrolment Projections (Bold represents Input Parameter)</b>							
Flow-through							
Year 1-2	<b>0.80</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>
Year 2-3	<b>0.90</b>		24	32	40	40	40
Year 3-4	<b>0.95</b>			21.6	29	36	36
Year 4					21	28	34
<b>Total</b>		30	64	103.6	140	154	160
<b>Revenue</b>		\$ 248,040	\$ 659,112	\$ 1,146,290	\$ 1,643,145	\$ 1,834,196	\$ 1,916,000
<b>Expenditures</b>							
<b>FT Faculty</b>	<b>#</b>						
Year 1 Shared Science	9	\$ 28,796	\$ 38,394	\$ 47,993	\$ 47,993	\$ 47,993	\$ 47,993
Year 1 Program	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 1 Electives	1	\$ 11,000	\$ 11,000	\$ 11,000	\$ 11,000	\$ 11,000	\$ 11,000
Year 2 Shared Science	8	\$ -	\$ 34,128	\$ 45,504	\$ 56,880	\$ 56,880	\$ 56,880
Year 2 Program	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 2 Electives	2	\$ -	\$ 22,000	\$ 22,000	\$ 22,000	\$ 22,000	\$ 22,000
Year 3 Shared Science	3	\$ -	\$ -	\$ 49,364	\$ 66,275	\$ 82,273	\$ 82,273
Year 3 Program	4	\$ -	\$ -	\$ 65,818	\$ 88,367	\$ 109,697	\$ 109,697
Year 3 Electives	3	\$ -	\$ -	\$ 33,000	\$ 33,000	\$ 33,000	\$ 33,000
Year 4 Shared Science	3	\$ -	\$ -	\$ -	\$ 47,993	\$ 63,990	\$ 77,702
Year 4 Program	4	\$ -	\$ -	\$ -	\$ 63,990	\$ 85,320	\$ 103,603
Year 4 Electives	3	\$ -	\$ -	\$ -	\$ 33,000	\$ 33,000	\$ 33,000
<b>Sub-Total</b>		\$ 39,796	\$ 105,522	\$ 274,679	\$ 470,498	\$ 545,153	\$ 577,148
<b>TA and Consumables Costs</b>							
Year 1 courses with labs	6	\$ 21,146	\$ 28,195	\$ 35,244	\$ 35,244	\$ 35,244	\$ 35,244
Year 1 courses with tutorials	9	\$ 20,396	\$ 27,195	\$ 33,994	\$ 33,994	\$ 33,994	\$ 33,994
Year 1 courses (lecture only, grading costs)	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 2 courses with labs	6	\$ -	\$ 16,917	\$ 22,556	\$ 28,195	\$ 28,195	\$ 28,195
Year 2 courses with tutorials	5	\$ -	\$ 9,065	\$ 12,087	\$ 15,108	\$ 15,108	\$ 15,108
Year 2 courses (lecture only, grading costs)	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 3 courses with labs	2	\$ -	\$ -	\$ 5,435	\$ 7,297	\$ 9,059	\$ 9,059
Year 3 courses with tutorials	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 3 courses (lecture only, grading costs)	5	\$ -	\$ -	\$ 140	\$ 188	\$ 233	\$ 233
Year 4 courses with labs	4	\$ -	\$ -	\$ -	\$ 10,043	\$ 13,391	\$ 16,261
Year 4 courses with tutorials	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Year 4 courses (lecture only, grading costs)	6	\$ -	\$ -	\$ -	\$ 163	\$ 218	\$ 264
<b>Sub-Total</b>		\$ 41,543	\$ 81,372	\$ 109,455	\$ 130,232	\$ 135,441	\$ 138,357
<b>Total</b>		\$ 81,338	\$ 186,894	\$ 384,134	\$ 600,730	\$ 680,593	\$ 715,505
<b>Gross Profit</b>		\$ 166,702	\$ 472,218	\$ 762,157	\$ 1,042,415	\$ 1,153,603	\$ 1,200,495
<b>Expenditures as % of Revenues</b>		32.8%	28.4%	33.5%	36.6%	37.1%	37.3%

Assumptions:

- One student = 1 FFTE
- No inflation factor is used
- Average salary for FT faculty member is \$90,000 plus 18.5% benefits
- Electives and Other Faculty courses at \$11,000 for each section of 50 students, including faculty and TA costs
- TA cost/hour (with 11% benefits) **38.85**
- Lab section size **24**
- Lab consumables cost/student/courses **\$25**
- Tutorial section size **36**
- Average TA contact hours/lab section **70**
- Average TA contact hours/tutorial section **70**
- Average hrs/student grading (no tut or lab) **1.2**
- Shared courses fit into existing sections of size N; ascribe enrolment/N cost to courses (assume others will take as electives)
- Shared courses fit into existing sections of size N for Year 1 **250**
- Shared courses fit into existing sections of size N for Year 2 **150**
- Shared courses fit into existing sections of size N for Year 3 **35**
- Shared courses fit into existing sections of size N for Year 4 **35**