New Course Submission Form (NCSF)

Date of Submission to the College Curriculum Committee:

Resource Person: Michelle A. Clark, Ph.D.

Course Information:

1. Course Title: Pharmacodynamics Principles and Cardiovascular Pharmacology.
2. Credit Hours: 4
3. Year/Semester: Fall 2010
4. Curriculum Requirement:
   ___XXX___Required ______ Elective
   ___XXX__Didactic ______ IPPE ______ APPE
5. Starting Date: August 2010

Course Description:
This course will apply the principles of organic chemistry, biochemistry, physiology, and pathophysiology to understand drug actions at the receptor, cellular and system levels under normal physiological and pathological conditions. Special emphasis will be placed on students understanding of determinants of drug absorption, distribution, physiological receptors, drug-receptor interaction, drug metabolism and elimination. This course will also focus on the drugs that act on the autonomic nervous system, cardiovascular system, and blood components as well. The rationale for the use of these therapeutic agents, their effects on cells, tissues, organ systems, and patients; the mechanisms underlying these effects; the therapeutic value of specific drug effects; and the adverse effects of the drugs will be addressed as well.

Rationale for proposed Course: The course is necessary for the implementation of changes to the curriculum for the international students. The Course will replace Clinical Pharmacology (PHA61010) in the curriculum for the International students. Clinical Pharmacology was designed as an accelerated pharmacology class that exposed the international students to most of the major pharmacology topics. As designed, this course will better facilitate the integration of the International Program Pharmacist into the entry-level class, as requested by ACPE. The proposed course contains topics from Pharmacodynamics I (PHA4100) and Pharmacodynamics II (PHA4210). The new curriculum for the international students requires that they enroll in Pharmacodynamics III (PHA5220) and Pharmacodynamics IV (PHA5230). With the addition of this course, these students will have a similar amount of Pharmacology as the traditional students.
Curricular Content:

Competency-Based Educational Outcomes:

All outcomes are Level 1:
A1.1.2.7. identify the cause of any adverse drug effects
A1.1.2.9. identify unnecessary drug duplication
A1.1.4.1. identify pharmacotherapeutic goals
A1.1.4.2. identify endpoints of therapy
A1.1.4.4.1. apply principles of anatomy and physiology to select appropriate drug therapy
A1.1.4.4.2. apply principles of biochemistry to select appropriate drug therapy
A1.1.4.4.4. apply principles of pharmacology to select appropriate drug therapy
A1.1.4.5. apply principles of pathophysiology to select appropriate drug therapy
A1.1.5.1. apply pharmacokinetics principles to select appropriate dose
A1.1.4.7. identify interactions associated with the recommended drug therapy
A1.1.4.8. anticipate possible adverse effects associated with the recommended drug therapy
A1.1.4.9. identify contraindications associated with the recommended drug therapy
A1.1.4.10. incorporate principles of medication safety with recommended drug therapy
A1.1.5.1. recommend appropriate complementary therapies to enhance therapeutic outcomes
A1.1.6.3. identify strategies to improve medication adherence
A1.1.6.4. monitor patient-specific objective parameters for drug efficacy
A1.1.6.7. determine whether patient-specific goals have been met
A1.1.6.9.1. anticipate adverse events
A1.1.6.9.2. anticipate drug interactions
A1.1.6.9.3. identify adverse events
A1.1.6.9.4. identify drug interactions
A1.1.6.9.10. manage adverse drug reactions

C2.1.2.1. educate patients about behaviors that maintain wellness
C2.1.2.2. educate patients about behaviors that promote health improvement
C2.1.2.3. educate patients about behaviors that prevent disease
C2.1.2.4. educate patients about behaviors that control disease

D6.2.4. conduct oneself in accordance with social guidelines in providing public health services
D6.2.5. conduct oneself in accordance with social guidelines in learning and classroom environments
D6.3.5. conduct oneself in accordance with ethical/professional guidelines in learning and classroom environments
D6.3.6. conduct oneself in accordance with ethical/professional guidelines in relation to one's peers
**Prerequisites:** Not applicable

**Course Objectives:**

This course is designed to provide the student with the background necessary for the clinical sciences and to help students acquire a body of knowledge about the drugs that will provide the foundation by which pharmacists will practice pharmaceutical care. The objective of this course is to familiarize the student with major pharmacology principles that surround the pharmacodynamics and pharmacokinetics of drug effects on the body. In addition the objective of the course is to expose students to the major classes of drugs that act on the autonomic nervous system, the cardiovascular system, and the blood components and for the student to rationale their use as therapeutic agents. At the completion of this course, the students should also possess an appreciation of the limits of their utility, the side effect profiles of the agents as well as the major drug interactions associated with the agents. It should provide the student with the knowledge and skills to understand the actions of the numerous drug classes.

**Delivery Methods:** Didactic teaching with overhead and powerpoint presentations. In some instances, case studies will be employed to exemplify drug efficacy and safety, as well as correct drug indications and patient compliance. Small group discussion will be held when needed. Course content will be delivered using a variety of teaching and learning methods including lectures, in-class and online discussions, assigned readings, self-study modules, and assignments. Class meetings will consist predominantly of lectures and informal open discussions.

WebCT will be utilized to provide and supplement course materials; to conduct online discussions; and to provide links to resources. All course handouts and information will be available to students through WebCT. Handouts will not be provided in class. All course materials will be provided in Adobe Acrobat format. Course announcements will be made in class and on the WebCT bulletin board. Students are responsible for all information posted on the electronic bulletin board as well as information announced in class.

**Assessment Methods:**

The final grade in this course will be determined from the scores obtained in four exams. The four exams will contribute each 25% to the final grade. On any exam (regular exams, make-up exams or remedial exams) questions may be of the multiple choice, K-type or essay type as determined by the instructors. Quizzes (announced/unannounced) may be also given during lecture time at the discretion of the instructor. The grades on the quizzes will be incorporated as part of the exam grade for that module. For example, if a 4-point quiz was administered then the grade that can be obtained on the exam is 96 points.
Attendance to the exams is mandatory. Students with unexcused absence will receive zero on the exam. Students missing more than one exam cannot complete the course.

**Course(s) Replaced:** Clinical Pharmacology: PHA6101

**Course Transmission:** WebCT, Tegrity

1. **Originating Site:**
   - XXX FTL
   - ______ WPB
   - _____ Tampa
   - _____ Ponce

2. **Videoconferencing:**
   - _____ Yes
   - _____ FTL
   - _____ Tampa
   - _____ WPB
   - _____ Ponce
   - XXX No

**Number of Students Expected:**

- 40 Total
- 40 FTL
- _____ WPB
- _____ Ponce
- _____ International


**Course Resources:**

1. **Faculty Member(s):** TBA

2. **Capital Equipment:** None

3. **Special Instructional Resources:**

4. **Library:**

5. **Space:** Requires an auditorium
Topics to be covered (in order):

<table>
<thead>
<tr>
<th>Class Sections</th>
<th>TOPICS TO BE COVERED</th>
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<tbody>
<tr>
<td>1, 2, 3</td>
<td>Overview of Biopharmaceutical Principles</td>
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<tr>
<td></td>
<td>• Drug administration</td>
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<td></td>
<td>• Drug absorption</td>
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<td>• Drug distribution</td>
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<td>• Drug elimination</td>
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<td>4, 5</td>
<td>Drug Metabolism</td>
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<td></td>
<td>1. Phase I Metabolism (Functionalization)</td>
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<td>• The Cytochrome P450 system</td>
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<td>• Drug interactions</td>
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<td>• Oxidations</td>
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<td>• Reductions</td>
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<td>• Hydrolysis</td>
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<td>• Pro drugs</td>
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<td>2. Phase II Metabolism (Conjugation)</td>
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<td></td>
<td>• (a). Glucuronide Conjugation</td>
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<td>• (b). Sulfate Conjugation</td>
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<td>• (c). Glutathione Conjugation</td>
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<td>• (d). Acetylation</td>
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<td>• (e). Methylation</td>
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<td>• (f). Amino Acid Conjugation</td>
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<tr>
<td>6, 7</td>
<td>Principles of Drug-Receptor Drug-Enzyme Interaction</td>
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<tr>
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<td>A. Receptor Theory Principles to include:</td>
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<td>• Lock and Key Model</td>
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<td>• Induced Fit Model</td>
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<td>• Affinity and Intrinsic Activity</td>
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<td>• Agonist, Antagonist (Reversible and Irreversible antagonist), Partial Agonist</td>
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<td>• Examples of Drug-Receptor Interaction</td>
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<td>B. Drug Induced Inhibition</td>
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<td>Irreversible Inhibition</td>
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</tbody>
</table>
|   | Transpeptidase - Penicillinase  
|   | Suicide Inhibition of Enzymes  
| C. | Dose-Response Curves  
|   | Quantal Responses  
|   | Graded Responses  
|   | Full vs. Partial Agonists  
|   | Double Reciprocal Plots  
| D. | Up/Down regulation of receptors and spare receptors  
| E. | Ion Channels  
|   | $\text{Na}^+$, $\text{K}^+$, $\text{Ca}^{++}$ AND GABA  
| F. | Second Messenger Systems and G-Proteins  
|   | G-Proteins  
|   | The Adenylate Cyclase Signaling System  
|   | The Phosphotidylinositol Bisphosphate Signaling System  
|   | Protein Kinase Signaling System  
| 8 | **Pharmacology of the Autonomic Nervous System and the Neuromuscular Junction**  
|   | Review of Basic Anatomy and Physiology  
|   | Parasympathetic and Sympathetic Nervous Systems.  
|   | Neuromuscular Junction.  
|   | Synaptic Transmission: synthesis, storage, release and inactivation.  
|   | Receptors: Pre and Postsynaptic at autonomic synapses and neuromuscular junction.  
|   | Agonists and Antagonists.  
|   | Clinical Uses of drugs.  
| 9 | **TEST 1**  
| 10-14 | **Pharmacology of the Autonomic Nervous System and the Neuromuscular Junction**  
|   | Review of Basic Anatomy and Physiology  
|   | Parasympathetic and Sympathetic Nervous Systems.  
|   | Neuromuscular Junction.  
|   | Synaptic Transmission: synthesis, storage, release and inactivation.  
|   | Receptors: Pre and Postsynaptic at autonomic synapses and neuromuscular junction.  
|   | Agonists and Antagonists.  

Clinical Uses of drugs.

15 TEST 2

16 - 23 Cardiovascular and Renal Pharmacology.
Hypertension: etiology and pathogenesis.
- Blood pressure regulation, vasoconstrictors and vasodilators.
- Drugs that lower blood pressure (antihypertensives).
- Drugs that interfere with the sympathetic nervous system.
- Diuretics and the renin angiotensin aldosterone system (ACE inhibitors and Angiotensin receptor blockers).
- The endothelium: nitric oxide, endothelins.
- Calcium channel blockers and potassium channel agonists.
- Drugs used to treat Ischemic Heart Disease.
- Drugs to treat Congestive Heart Failure
- Drugs to treat Cardiac Arrhythmia

24 TEST 3
25-28 Cardiovascular and Renal Pharmacology contd…

28-31 Lipid lowering drugs, anticoagulants & antianemics.
- Lipid-lowering drugs
- Drugs used to treat Anemia
- Anticoagulants and anti-platelet drugs

32 TEST 4

Summary of Topics and Exams

<table>
<thead>
<tr>
<th>TITLE</th>
<th>HOURS</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of Biopharmaceutical Principles</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Drug Metabolism</td>
<td>4</td>
<td>1</td>
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<tr>
<td>Principles of Drug-Receptor Drug-Enzyme Interaction</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Pharmacology of the Autonomic Nervous System and the Neuromuscular Junction</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Cardiovascular and Renal Pharmacology</td>
<td>22</td>
<td>5.5</td>
</tr>
<tr>
<td>Lipid lowering drugs, anticoagulants and antianemics</td>
<td>10</td>
<td>2.5</td>
</tr>
<tr>
<td>Exam hours</td>
<td>6</td>
<td>1.5</td>
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<tr>
<td>TOTAL HOURS/WEEKS</td>
<td>64</td>
<td>16</td>
</tr>
</tbody>
</table>
**Course Approval:**

Department Approval: ____________________________________________  
Department Chair  Date

Curriculum Committee Approval: _________________________________  
Curriculum Chair  Date

Faculty Approval Date:__________________________________________

College Approval: _____________________________________________  
Executive Associate Dean for Professional