New Course Request

Indiana University

IUPUI Campus

Check Appropriate Boxes: Undergraduate credit ☐ Graduate credit ☒ Professional credit ☐

1. School/Division Graduate 2. Academic Subject Code GRAD

3. Course Number 6715 (must be cleared with University Enrollment Services) 4. Instructor Hurley/Locevar

5. Course Title Biomedical Science I --- Biochemical Basis of Biological Processes Recommended Abbreviation (Optional) Biomed I

(Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year): Fall 2007

7. Credit Hours: Fixed at 3 or Variable from ________ to ________

8. Is this course to be graded SF (only)? Yes ☐ No X ☒

9. Is variable title approval being requested? Yes ☐ No X ☒

10. Course description (not to exceed 50 words) for Bulletin publication: One of three biomedical science courses intended for incoming doctoral graduate students in the School of Medicine or other graduate students. Covers molecular and metabolic aspects of cellular function. The course will explore topics in the biochemical basis of biological systems, including biological macromolecules, protein ligand interactions, cell-signaling, and metabolic processes.

11. Lecture Contact Hours: Fixed at 36 or Variable from ________ to ________

12. Non-Lecture Contact Hours: Fixed at ________ or Variable from ________ to ________

13. Estimated enrollment: 40 of which 100 percent are expected to be graduate students.

14. Frequency of scheduling: Annually Will this course be required for majors? YES

15. Justification for new course: Restructuring of graduate program requirements.

16. Are the necessary reading materials currently available in the appropriate library? YES

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials. ATTACHED

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant. None

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted. ATTACHED

Submitted by: Date 11/11/02

Dean of Graduate School (when required) Date 11/11/02

Approved by: Date

Dean Date

Chancellor/Vice-President Date

University Enrollment Services Date

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.
I. **Title:** Biomedical Science I – Biochemical Basis of Biological Processes  
   Course number: G715  
   Instructors: Thomas Hurley and Barbara Hocevar  
   Prerequisites: none

II. **COURSE DESCRIPTION AND RATIONALE**  
   One of a group of three introductory biomedical science, lecture-based, core courses intended for all incoming basic science doctoral graduate students in the School of Medicine programs or other interested graduate or GCND students. Covers molecular and metabolic aspects of cellular function. The course will explore topics in the biochemical basis of biological systems, including biological macromolecules, protein-ligand interactions, cell-signaling, and metabolic processes. Course presentations will include PowerPoint computer presentations, overhead presentations, as well as web-based exercises.

III. **EDUCATIONAL OBJECTIVES**  
   - Know the structure and organization of proteins and membranes in cells.  
   - Understand the nature of interactions between macromolecules and small molecule ligands.  
   - Know the key metabolic pathways leading to energy generation and the synthesis of key energy stores.  
   - Understand how metabolism is coordinately coupled to the generation of useful work.  
   - Know the mechanisms by which cytokines can transduce intracellular signals.  
   - Know the mechanisms by which key second messengers transmit extracellular signals to intracellular targets.  
   - Know the molecular mechanisms that are important in maintaining metabolic homeostasis.

IV. **COURSE CONTENT:**

**Macromolecules Block**  
Topic 1 – Amino acids, hierarchical approach to protein structure  
   (primary, secondary, motifs, domains, tertiary & quaternary)  
Topic 2 – Bioinformatics of Protein structure  
Topic 3 – Prediction of structure and influences on protein stability  
Topic 4 – Protein modifications that influence localization, function or life-time: phosphorylation, acetylation, ubiquitination, lipids

**Protein-Ligand Interactions Block**  
Topic 1 – Thermodynamics; ΔH, ΔS, ΔG, K_{eq}  
Topic 2 – Simple binding models (Scatchard analyses)  
Topic 3 – Substrate binding and cooperative interactions in enzymes  
Topic 4 – Principles of enzymatic catalysis  
Topic 5 – Enzyme inhibition  
Topic 6 – Principles of macromolecular interactions  
Topic 7 – Basic concepts of drug targeting and design
EXAM 1

Membrane Biochemistry
  Topic 1 – Lipids and membranes, membrane structure and function
  Topic 2 – Biophysical properties of membranes, ion channels & pores
  Topic 3 – Excitable membranes and signal transmission

Cell Signaling Block
  Topic 1 – Concepts & overview
  Topic 2 – Modular design of signaling macromolecules
  Topic 3 – Receptors: GPCRs>G proteins>2nd messengers
  Topic 4 – Receptors: RPTKs>Ras>MAPK cascade
  Topic 5 – Receptors: Cytokine signaling
  Topic 6 – Apoptosis/cell death signaling
  Topic 7 – Cell-Cell signaling
  Topic 8 – Chemical Biology approaches in signaling pathways

EXAM 2

Characterization of Macromolecules
  Topic 1 – Glycosylation and glycobiology
  Topic 2 – Proteomics
  Topic 3 – Macromolecular assemblies
  Topic 4 – Macromolecular networks and systems biology

Metabolic Processes Block
  Topic 1 – Overview of Metabolism and Digestion
  Topic 2 – Metabolic Design (Bioenergetics)
  Topic 3 – Metabolism of carbohydrates
  Topic 4 – Glucose homeostasis and Diabetes
  Topic 5 – Regulation of mitochondrial energy production
  Topic 6 – Reactive oxygen species and maintenance of reducing equivalents
  Topic 7 – Lipid and cholesterol metabolism
  Topic 8 – Amino acid metabolism/Urea cycle/Neurotransmitter metabolism
  Topic 9 – Integration of metabolism
  Topic 10 – Dissection of metabolic integration through chemical interference

EXAM 3

V. REQUIRED AND RECOMMENDED TEXTS:


VI. EVALUATION AND GRADING:

Student grades in the course will be determined by three examinations, each covering approximately one-third of the material with no comprehensive final. Exam will be a
combination of short answer/fill in the blank questions and short essay questions. Each exam will contribute one-third of the final grade. Objectives covered in the lectures will be the source of all examination questions.

Grading Scale:

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100</td>
</tr>
<tr>
<td>A-</td>
<td>90-92.99</td>
</tr>
<tr>
<td>B+</td>
<td>87-89.99</td>
</tr>
<tr>
<td>B</td>
<td>75-86.99</td>
</tr>
<tr>
<td>C</td>
<td>60-74.99</td>
</tr>
<tr>
<td>D</td>
<td>50-59.99</td>
</tr>
<tr>
<td>F</td>
<td>&lt;50</td>
</tr>
</tbody>
</table>

Note that grades of C and lower are not passing grades in graduate level courses.

VII. BIBLIOGRAPHY:

Representative sample of the selected readings related to the course:


VIII. CHEATING AND PLAGIARISM:

Students are instructed to make themselves aware of University regulations concerning plagiarism, the maintenance of academic honesty and the definitions of unacceptable behavior and cheating. Academic misconduct of any sort will not be tolerated and will be dealt with as outlined in the IU/IUPUI Code of Student Rights, Responsibilities, and Conduct, which can be viewed at:

http://www.life.iupui.edu/help/docs/Part_3all.html
Examples of misconduct include but are not limited to:

1. Cheating
   A student must not use or attempt to use unauthorized assistance, materials, information, or study aids in any academic exercise.

2. Fabrication
   A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citations to the sources of information.

3. Plagiarism
   A student must not adopt or reproduce ideas, words, or statements of another person without appropriate acknowledgment. A student must give credit to the originality of others and acknowledge an indebtedness whenever he or she does any of the following:
   a. Quotes another person's actual words, either oral or written
   b. Paraphrases another person's words, either oral or written
   c. Uses another person's idea, opinion, or theory; or
   d. Borrows facts, statistics, or other illustrative material, unless the information is common knowledge.

4. Interference
   a. A student must not steal, change, destroy, or impede another student's work.
   b. A student must not give or offer a bribe, promise favors, or make threats with the intention of affecting a grade or the evaluation of academic performance.

Potential consequences for academic misconduct:

If the instructor has information that one of his/her students committed an act of academic misconduct, the faculty member will hold an informal conference with the student. The conference will be prompt and private. If the faculty member concludes that the student is responsible for the misconduct, then the faculty member will impose an appropriate academic sanction (i.e., lower or failing grade on the assignment, assessing a lower or failing grade for the course).

IX. AMERICANS WITH DISABILITIES ACT:

If you need any special accommodations due to a disability, please contact Adaptive Educational Services at (317)-274-3241. The office is located in CA 001E.
Letter from IUPUI Biology

From: Lees, Norman D
Sent: Monday, October 23, 2006 5:46 PM
To: Rhodes, Simon J
Subject: Re: new course requests

Simon,

I see no significant overlap among the courses you are proposing and the ones we offer in Biology.

Doug

Dear Doug and Frank,

Please find attached a Word file that outlines three proposed graduate level courses in biomedical sciences. These three courses will be the core series that incoming IUSM PhD students will take in their first semester when we switch to a common entry system for our PhD programs. They are each three credits. I expect that the typical enrollment will be mostly the incoming PhD student class (~35-40 students) plus perhaps a few prospective students that might be "sampling" the curriculum. All of the classes will be open to any IUPUI student that wants to take them but I do not really expect a significant enrollment from non-IUSM students. I do not think that the courses conflict with your course offerings.

I would like to submit course requests to the IUPUI graduate committee (GAC) as soon as possible. This committee typically wants to know that proposed new courses will not conflict with existing campus course offerings. I am therefore writing to ask if you would review the course outlines and please let me know if you agree.

A reply by e-mail would be fine.

Please let me know if you have any questions.

Thanks very much,

Simon

*****************************************
Simon J. Rhodes, Ph.D.
Associate Dean for Graduate Studies
Indiana University School of Medicine
*****************************************

Attachment converted: Macintosh HD:BioMed Series - Lees#356DC1.doc (WDBN/«IC») (00356DC1)
Letter from IUPUI Chemistry and Chemical Biology

From: schultz@chem.iupui.edu
Sent: Wednesday, October 25, 2006 3:58 PM
To: Rhodes, Simon J
Subject: Re: new course requests

Simon

I do not foresee any conflicts with our course offerings.

Best wishes,

Frank

Franklin A. Schultz
Professor and Chair
Department of Chemistry and Chemical Biology
Indiana University Purdue University Indianapolis
402 North Blackford Street, LD 326
Indianapolis, IN 46202
Phone: 317-278-2027 or 317-274-6875
Fax: 317-274-4701
schultz@chem.iupui.edu

On Sunday, October 22, 2006, at 10:24 AM, Rhodes, Simon J wrote:

Dear Doug and Frank,

Please find attached a Word file that outlines three proposed graduate level courses in biomedical sciences. These three courses will be the core series that incoming IUSM PhD students will take in their first semester when we switch to a common entry system for our PhD programs. They are each three credits. I expect that the typical enrollment will be mostly the incoming PhD student class (~35-40 students) plus perhaps a few prospective students that might be "sampling" the curriculum. All of the classes will be open to any IUPUI student that wants to take them but I do not really expect a significant enrollment from non-IUSM students. I do not think that the courses conflict with your course offerings.

I would like to submit course requests to the IUPUI graduate committee (GAC) as soon as possible. This committee typically wants to know that proposed new courses will not conflict with existing campus course offerings. I am therefore writing to ask if you would review the course outlines and please let me know if you agree.

A reply by e-mail would be fine.
Please let me know if you have any questions.
Thanks very much,

Simon

Simon J. Rhodes, Ph.D.
Associate Dean for Graduate Studies
Indiana University School of Medicine
November 7, 2006

Sherry F. Queener, Ph.D.
Director of the Graduate Office, IUPUI

Dear Dr. Queener,

Please find enclosed three requests for new courses in biomedical sciences for graduate students in the School of Medicine as well as interested graduate students from other programs on campus.

Rationale for proposed courses:
In the past, the 10 School of Medicine biomedical science Ph.D. programs have recruited and admitted students separately. However, beginning in fall 2007 the School will begin a new “open enrollment/gateway/umbrella” system (named IBMG, for IU School of Medicine Biomedical Gateway) that will provide a common first year experience for all School of Medicine biomedical science predoctoral students. This first year community of students will take a shared curriculum with common first year components in basic biomedical science topics. The first semester curriculum will be the three biomedical science courses that are submitted here for your consideration. These courses include the basic components that all of the degree programs request in their base beginning courses. Later, the curriculum will also include modules for the development of professional skills, career development, ethics, and community engagement. A strong sense of community will be built among the students through the curriculum and through social events. In the first part of the year, students also will learn about the research opportunities available at the School of Medicine through interactions with the Program Directors and research faculty in classes, laboratory visits, and research retreats. First year students will have the freedom to choose laboratories from any School of Medicine Department/Program for three half-semester research rotations (to begin in the middle of the first semester). At the end of the first year, students will be free to “differentiate” and join any of the School of Medicine biomedical science Ph.D. degree programs from which they will ultimately receive their degree.

There are many reasons comprising the rationale for switching to an open enrollment system. Importantly, it has been the experience of other medical school graduate programs that have made a similar change that this approach results in a happier community of graduate students and in a higher overall quality of student. Further, the open enrollment system will make School of Medicine graduate education better reflect the interdisciplinary nature of modern biomedical research. For example, incoming students will be able to consider a focus on a research area, such as diabetes-related research or cancer-related research for example, and will have the freedom to rotate in and consider joining labs with different Ph.D. program affiliations who work on those topics. It is also expected that the open enrollment system will promote research collaborations between School research laboratories because there will be an increased sense of community and an improved contact network within the graduate student population. In addition, the sharing of resources will allow the School to strengthen and improve its graduate student recruiting efforts (including hiring staff dedicated to recruiting and program management) with a goal of improving admitted student numbers, diversity, and quality. The system will improve the
attractiveness of graduate study at the School of Medicine by offering potential students more choice and flexibility in their degree programs.

Overview of Courses:
The three courses are 3-credit courses in biomedical science that will cover topics including molecular and metabolic aspects of cellular function, molecular biology and genetics, and the organization and function of cells, tissues and physiologic systems using disease examples.

The courses will be delivered in the fall semester. The topics of the courses are coordinated so that topics being discussed in ongoing lectures in Biomed 1 prepare students for upcoming lectures in Biomed 2 and 3, and so on. Of course, each of the courses can also stand alone.

Review for Overlap with Current Courses at IUSM and IUPUI
The proposed courses have been designed by a curriculum committee with representatives from all 10 PhD programs/Departments of the School of Medicine. These are:

- Anatomy and Cell Biology
- Biochemistry and Molecular Biology
- Medical and Molecular Genetics
- Medical Biophysics and Biomolecular Imaging
- Medical Neuroscience
- Microbiology and Immunology
- Pathology and Laboratory Medicine
- Pharmacology
- Toxicology

The courses therefore have been approved by all relevant units of the School.

The course descriptions have also been sent to the chairs of the IUPUI Biology and Chemistry & Chemical Biology Departments for review. Letters confirming that no conflict exists are attached.

Thank you for your consideration,

Simon J. Rhodes, Ph.D.
Associate Dean for Graduate Studies
Indiana University School of Medicine
srhodes@iupui.edu