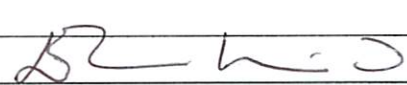
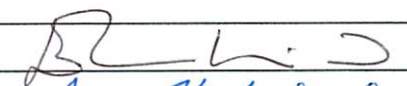
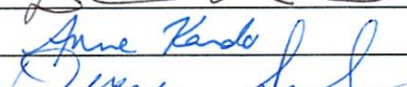
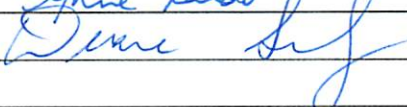



LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		11-1266	App-4/3/12	App-9/11/12

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person Jonathan Southard	Email Address southard@iup.edu
Proposing Department/Unit Biochemistry Program	Phone 724-357-2210

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply) <input type="checkbox"/> New Course <input type="checkbox"/> Course Prefix Change <input type="checkbox"/> Course Deletion <input type="checkbox"/> Course Revision <input checked="" type="checkbox"/> Course Number and/or Title Change <input checked="" type="checkbox"/> Catalog Description Change	
BIOC 302 Biochemistry II BIOC 302 Advanced Biochemistry	
<i>Current Course prefix, number and full title</i> <i>Proposed course prefix, number and full title, if changing</i>	
2. Additional Course Designations: check if appropriate <input type="checkbox"/> This course is also proposed as a Liberal Studies Course. <input type="checkbox"/> Other: (e.g., Women's Studies, Pan-African) <input type="checkbox"/> This course is also proposed as an Honors College Course.	
3. Program Proposals <input type="checkbox"/> New Degree Program <input type="checkbox"/> Program Title Change <input type="checkbox"/> Program Revision <input type="checkbox"/> New Minor Program <input type="checkbox"/> New Track <input type="checkbox"/> Other	
<i>Current program name</i> <i>Proposed program name, if changing</i>	
4. Approvals	
Department Curriculum Committee Chair(s)	 Date: 2/29/12
Department Chair(s)	 Date: 2/29/12
College Curriculum Committee Chair	 Date: 3/9/12
College Dean	 Date: 3/12/12
Director of Liberal Studies *	
Director of Honors College *	
Provost *	
Additional signatures as appropriate: (include title)	
UWUCC Co-Chairs	 Date: 4/3/12

Received

MAR 12 2012

Liberal Studies

Part II Description of Curriculum Change

1. New Catalog Description

BIOC 302 Advanced Biochemistry

(3c-0l-3cr)

Prerequisite: Grade of C or better in BIOC 301

Examination of biochemical processes with a focus on metabolism. Central pathways considered in detail, including regulatory mechanisms and hormonal signaling. Other selected processes and integration of mammalian metabolism are explored. Assumes an understanding of concepts relating to structure/function relationships for biomolecules, biological membranes, and signaling included in BIOC 301.

2. Proposed Changes and Old Catalog Description

- a) Change in course title from Biochemistry II to Advanced Biochemistry
- b) Change in prerequisite to require grade of C or better in current prerequisite course
- c) Change course description to more accurately reflect the course content and relationship to prerequisite foundation course (BIOC 301)

d) Old Catalog Description

BIOC 302 Biochemistry II

(3c-0l-3cr)

Prerequisite: BIOC 301

A continuation of BIOC 301 concerning metabolism of nitrogen, amino acids, nucleotides, and nucleic acids and the function of cell membranes, hormones, and specialized tissues.

3. Justification/Rationale for the Change

Revised American Chemical Society guidelines categorize courses as 'foundation' or 'in-depth' courses, which build on the foundation courses. For the ACS-certified B.S. in Chemistry, students must complete a foundation course in biochemistry. The accompanying course proposal for BIOC 301 identifies it as a foundation course. The new catalog description for BIOC 302 more clearly identifies it as a course which examines aspects of biochemistry in-depth and builds on concepts included in BIOC 301. Students seeking an ACS-certified degree could complete BIOC 302 as one of four required in-depth courses.

The course prerequisite is changed to ensure that students have a sufficient grasp of the required concepts to succeed in the advanced course.

The new course description does not reflect a change in course content, rather it more accurately reflects the current content.

Syllabus of Record for BIOC 302

I. Catalog Description

BIOC 302 Advanced Biochemistry

(3c-0l-3cr)

Prerequisite: Grade of C or better in BIOC 301

Examination of biochemical processes with a focus on metabolism. Central pathways considered in detail, including regulatory mechanisms and hormonal signaling. Other selected processes and integration of mammalian metabolism are explored. Assumes an understanding of concepts relating to structure/function relationships for biomolecules, biological membranes, and signaling included in BIOC 301.

II. Course Outcomes: Upon successful completion of this course, the student will be able to:

- 1. Categorize biochemical reactions by reaction type and nature of energy transformation that occurs.**
- 2. Apply thermodynamic principles to biochemical processes; specifically to determine whether a given process will be spontaneous or require an input of energy and how cellular conditions will affect near-equilibrium processes.**
- 3. Use the principles of regulation of biochemical processes to make reasonable predictions regarding regulatory factors and mechanisms for any biochemical process.**
- 4. Describe the salient chemical and bioenergetic features of these metabolic processes: glycolysis, gluconeogenesis, pentose phosphate pathway, glycogen synthesis, glycogenolysis, fatty acid oxidation, fatty acid synthesis, citric acid cycle, oxidative phosphorylation.**
- 5. Explain the physiological function of the metabolic processes above including tissue specificity and effect of various physiological states on the activity of each process.**
- 6. Explain how interorgan metabolic processes in animals integrate biochemical processes at the organismal level including mechanisms for coordinated regulation of these processes.**

III. Detailed Course Outline: (allows 3 hours for exams)

- 1. Principles of Bioenergetics and Metabolism (6 hr)**
Thermodynamics, nature of metabolic pathways, regulatory mechanisms, common reaction types, ATP and phosphoryl group transfer reactions, electron carriers and biological redox reactions
- 2. Carbohydrate Metabolism (8 hr)**
Glycolysis, gluconeogenesis, pentose phosphate pathway, glycogen synthesis, glycogenolysis, coordinated regulation of pathways
- 3. Exam 1 (1 hr)**
- 4. Citric Acid Cycle (4 hr)**
formation of acetyl-CoA, cycle reactions, catabolic and anabolic roles, anapleurotic reactions, regulation, glyoxylate cycle
- 5. Oxidative Phosphorylation (4 hr)**
Mitochondrial context, electron transport chain, proton-motive force, ATP synthase, regulation
- 6. Photosynthesis (3 hr)**
Chloroplast context, light reactions, dark reactions, photorespiration
- 7. Exam 2 (1 hr)**
- 8. Fatty Acid Catabolism (4 hr)**
Mobilization, activation and transport into mitochondrion, beta oxidation, regulation, oxidation of odd-chain fatty acids, ketone formation
- 9. Lipid Biosynthesis (4 hr)**
Transport of acetyl-CoA into cytosol, fatty acid synthase, cholesterol synthesis and transport, regulation

10. Amino Acid Metabolism (3 hr)
Transport of amino N to liver, urea cycle, overview of amino acid oxidation and synthesis pathways, overview of nucleotide synthesis pathways
11. Exam 3 (1 hr)
12. Integration & Hormonal Regulation of Metabolism (3 hr)
Metabolic profiles of organs, interorgan pathways, regulation of fuel metabolism by insulin, glucagon, and epinephrine, metabolism in fasting and diabetes
13. Final Exam (cumulative and integrative)

IV, Evaluation Methods.

4 exams including final @ 100 pts	400 pts.
Quizzes and Problem Sets	100 pts
Literature Assignment	100 pts
Total points	600 pts.

Example Grading Scale: The percentages of the total points to guarantee each letter grade are as follows:

$x \geq 90\%$	A
$90 > x \geq 80\%$	B
$80 > x \geq 70\%$	C
$70 > x \geq 60\%$	D
$60 > x$	F

- V. Undergraduate Course Attendance Policy: Attendance is expected for all classes. Individual faculty will include in their syllabus an attendance policy consistent with the Undergraduate Course Attendance Policy in the IUP Undergraduate Catalog.

- VI. Special Resource Requirements: (None)

- VII. Required Textbook(s), Supplemental Books and Readings:
Voet D, Voet JG, Pratt CW Fundamentals of Biochemistry, 3rd Ed., Wiley, New York, 2008. (required)
Relevant primary and secondary research literature accessible online or via IUP Libraries
Relevant online resources including databases for metabolism (see Bibliography, item 9)

VIII. Bibliography

1. Nelson DL, Cox MM Lehninger Principles of Biochemistry, 5th Ed., Freeman, New York, 2008
2. Berg JM, Tymoczko JL, Stryer L Biochemistry, 6th Ed. Freeman, New York, 2007
3. Garrett RH, Grisham CM Biochemistry, 4th Ed. Brooks-Cole, Belmont, CA, 2008
4. Voet D, Voet JG Biochemistry, 4th Ed., Wiley, New York, 2011
5. Salway, J Metabolism at a Glance, 3rd Ed. Wiley, New York, 2004
6. Rosenthal, MD Medical Biochemistry: Human Metabolism in Health and Disease, 1st Ed. Wiley, New York, 2009
7. Kim, BH, Gadd, GM Bacterial Physiology and Metabolism 1st Ed. Cambridge, Cambridge, 2008
8. Ockner, RK Integration of Metabolism, Energetics, and Signal Transduction, 1st Ed. Springer, New York, 2010
9. Online databases for metabolism
Human Metabolome Database: www.hmdb.ca/
KEGG PATHWAY Database: www.genome.jp/kegg/pathway.html