

Application for a New Course v10.5

Course ID <i>Subject and Number</i>	CHEM 456
Date APPROVED	
Date DENIED	

I. Systems and Catalog Information Complete each item.

1	Course Developer	Autumn Sutherlin
2	Course Teacher	Autumn Sutherlin
3	Course Title	Biochemistry III: Metabolism
4	Course Abbreviation (if title is over 30 characters)	
5	College	CAS
6	Department	Chemistry and Biochemistry
7	Number of Credit Hours	2
8	Is the course Fixed Credit or Variable Credit?	Fixed
9	Is the course repeatable?	No
10	Maximum number of times course may be repeated	0
11	Maximum number of hours credit	2
12	Explanation for variable credit	N/A
13a	Course contact hours - LEC	2
13b	Course contact hours - Lab	0
13c	Course contact hours - Practicum	0
13d	Course contact hours - Seminar	0
13e	Course contact hours - Studio	0
13f	Course contact hours - Online	0
13g	Course contact hours - Colloquium	0
13h	Course contact hours – Field Experience	0
13j	Course contact hours - Internship	0
13k	Course contact hours - Research	0
13m	Course contact hours - Workshop	0
13n	Course contact hours – Other (specify)	0
14	Instructor Workload	2
15	Grade Mode (check all appropriate):	☒ Standard ☒ Credit/No Credit (undergrad only)
16	Maximum Enrollment	40
17	Catalog Description (50 words or less)	Presents the biochemistry of metabolic pathways with an emphasis on integration and regulation.
18	List any prerequisites (course/s, test scores, class standing, major, etc.)	A grade of "C" or better in CHEM 453/ Biol 472

19	List any co-requisites	N/A
20	If the course is cross listed, specify the Course ID(s) MUST have signature in Section V off all Department Chairs	N/A
21	Does this course have any special student costs? Yes/No <i>Attach a <u>completed</u> "Request to Add or Change Course Fees" form. Describe in section IV-F.</i>	No
22a	How often will it be offered? Fall	None
22b	How often will it be offered? Spring	Annually
22c	How often will it be offered? Summer	None
23	Frequency? All, odd, or even years?	All
24	First semester this course will be offered <i>New courses may not be taught under their approved course ID until they appear in the catalog, therefore, no earlier than the coming fall.</i>	Spring 2017
25	List course/s that should be deleted, include the last semester for course/s being deleted <i>A course cannot be deleted when it is a requirement in a degree plan in any department.</i>	None
26	Is this course required for a degree/s? Yes/No <i>If "Yes," attach a revised degree plan(s) reflecting the placement of the new course.</i>	Yes (BCHA, BCHC, BCHE, BCHS, BCHV, and HPCO)
27	Should the addition of this course be retroactively applied to the degree plan it supports? Yes/no and explain	No, some students will have completed the course it is replacing.
28	Has this course been offered as a Special Topics course? Yes/No <i>If "Yes," specify the Course ID and enrollment for each term it was taught. (Note: New courses are NOT required to be taught as Special Topics courses prior to being approved. However, courses may be taught once as Special Topics before it is proposed. See the Course Descriptions section of the Catalog for details.)</i>	No
29	List any courses in which content overlaps the proposed course. (Course ID and Name) <i>Attach statement from instructor/dept chair of existing course justifying the new offering in Section IV-D.</i>	N/A

3	Recognize that fundamental chemical principles and reactions are utilized in biochemical processes and demonstrate that biochemical reactions are not special, but follow fundamental chemical principles to achieve viability.	Exam I, II, III, Final Exam, Metabolic Pathway Project.
4	Synthesize readings from the text and journal articles into existing biochemistry schema.	Reading homework, Journal Article discussion
5	Predict the effect of a regulatory molecule on the function of a metabolic pathway.	Exam I, II, III Final Exam
6	Integrate newly presented pathways into the overall metabolic scheme of the cell.	Final Exam, Metabolic Pathway Project.
7	Judge whether a proposed or hypothetical reaction is consistent with the general framework of catabolic and anabolic metabolism.	Final Exam, Metabolic Pathway Project.
8	Communicate principles of metabolism to a scientific audience.	Metabolic Pathway Project.
9		

3. Text and Resources

1. Give the full publication information of the textbook/s and other required resources and outside readings.

Berg, J.; Tymoczko, J.; Stryer, L. *Biochemistry*; 8th ed. W.H. Freeman and Company: New York, 2015.*

*This is the text also used for Biochemistry I and II, so the students will not have to purchase a new text.

Selected journal articles from Journals such as *Biochemistry*, *Journal of Biological Chemistry*, and *Proceedings of the National Academy of Sciences*. Examples of the types of articles are below:

1. Jin, E.S.; Sherry, A.D; Malloy, C.R. Interaction between the pentose phosphate pathway and gluconeogenesis from glycerol in the liver. *JBC* **2014**, 289, 32593–32603.
2. Zhang, M.M.; Tsou, L.K.; Charron, G.; Raghavan, A.S.; and Hang, H.C. Tandem fluorescence imaging of dynamic S-acylation and protein turnover. *PNAS* **2010**, 107, 8627-8632.
3. Liu, X; Pavlovsky, A.G.; Viola, R.E. The structural basis for allosteric inhibition of a threonine-sensitive aspartokinase. *JBC* **2008**, 283, 16216–16225.
4. Strijbis, K.; van Roermund; C.W., van den Burg, J. van den Berg, M., Hardy: G.P.M, Wanders, R.J.A; Distel, B; Contributions of carnitine acetyl-transferases to intracellular acetyl unit transport in *Candida albicans*. *JBC* **2010**, 285, 24335–24346.

5. Guttman, M.; Prieto, J.H; Croy, J.E.; Komives, E.A. Decoding of Lipoprotein-Receptor Interactions: Properties of ligand binding modules governing interactions with apolipoprotein E. *Biochemistry* **2010**, *49*, 1207–1216

2. For **combined undergraduate/graduate** courses, make two lists:

- a. full publication information; label **Undergraduate**.
- b. full publication information; label **Graduate**. Indicate number of pages required.

IV. Supporting Documentation

Supporting documents must accompany proposal prior to preliminary approval by chair and dean.

1	Library — Submit new course application and syllabus to the Dean of the Library. Consult with the director and establish a deadline for completion of the library report. Attach the signed copy of the Library report.
2	Instructional Design — The application and syllabus must be reviewed by the Adams Center. Attach a copy of the Adams Center Review Letter.
3	Content Overlap — Include one document for each course you listed in Section I-I. Attach statement from instructor/dept chair of existing course justifying the new offering.
4	Departmental Resources — List the resources that support the course and are available only through the department, if applicable. Attach the list of the holdings and the location/s.
5	Resources — List resources (other than library or departmental resources) that are needed to support this course (computers, lab equipment, other technology, etc.). Attach a complete list of all items and indicate possible sources or estimated cost of each. List the sources of any needed funds.
6	Expenses — List additional expenses needed to implement this course (full-time or part-time faculty, graduate or lab assistants, student employees, travel, special student costs, room renovation, storage facility, etc.). Attach a complete list of all items, the estimated cost of each and the source of the funds.
7	Justification — Attach all documents referred to in Section II-2
8	Syllabus — Attach the syllabus for the course based upon the anticipated first-semester offering.
9	Provide documentation for all additional attachments here

V. Preliminary Approvals

All supporting documentation has been assembled and attached to this application. I believe this course is ready to be presented to appropriate councils. We have a plan to fund this new course.

Course Number and Name CHEM 456

Primary Department

K. D. Posh
Department Chair

1-12-16
Date

[Signature]
Dean of the College
2/29/16
Date

Cross-listing Department *Add more lines if multiple departments are cross-listing*

Department Chair

Date

Dean of the College

Date

Cross-listing Department *Add more lines if multiple departments are cross-listing*

Department Chair

Date

Dean of the College

Date

VI. Actions *Place all actions on one page.*

Course ID: CHEM 456

Course Title: Biochemistry III: Metabolism

1. College Academic Council: (for all courses)

Note: Insert additional lines for College Academic Council action for each college involved in cross-listed courses.

Approved ☒ Denied ☐ *[Signature]* 2-19-16
College Dean or Director Date

Approved ☐ Denied ☐ *[Signature]* 2/24/16
College Dean or Director Date

2. Graduate Council: (for graduate level courses)

Approved ☐ Denied ☐ _____ Date _____
Dean of Graduate School

3. Teacher Education Council: (when applicable)

Approved ☐ Denied ☐ _____ Date _____
TEC Chair

4. University General Education Council: (when applicable)

Approved ☐ Denied ☐ _____ Date _____
Provost's designee

5. University Undergraduate Academic Council: (*undergraduate level courses*)

Approved ☐ Denied ☐ _____ Date _____
Vice Provost

6. Academic Provost: (for all courses)

Approved ☐ Denied ☐ _____ Date _____
Provost

7. President of the University: (for all courses)

Approved ☐ Denied ☐ _____ Date _____
President

Attach notes, comments, or conditions from appropriate councils:

Justification for Chem 456 Biochemistry III: Metabolism

Biochemistry majors generally go to graduate or professional school after ACU. Additional Biochemistry course work better prepares students for their next steps. The addition of Biochemistry III will allow us to cover up to 10 more chapters of the Biochemistry text. The majority of the new material will be in Biochemistry III, although moving 2.5 chapters from Biochemistry II to Biochemistry III will allow for 2-4 additional chapters of material in Biochemistry II.

New chapters (or parts of chapters) that were not previously covered are marked with an asterisk.

Topics covered in Biochemistry I, II, and III

Biochem I - Introduction to Biochemistry (3 hrs)

Introduction
Protein structure and function
Nucleic acid structure and function
Bioinformatics
Hemoglobin
Enzymes
Catalytic Mechanism
Regulatory Strategies
Carbohydrates
Lipids and Membranes
Introduction to Metabolism
Glycolysis and Gluconeogenesis
The Krebs's Cycle
Oxidative Phosphorylation

Biochem II –Gene Expression (3 hrs)

Protein Techniques
Nucleic acid Techniques
Signal Transduction
Replication
Transcription
Translation
Prokaryotic Expression*
Eukaryotic Expression*
Sensory Systems (if time) *
Molecular Motors (if time)*
Also includes major project

Biochem III – Metabolism (2 hrs)

Photosynthesis*
Calvin Cycle* and PPP*
Glycogen*
FA metabolism
Protein turnover and amino acid catabolism*
Biosynthesis of Amino Acids
Nucleotide Biosynthesis*
Membrane lipid* and Steroid Biosynthesis
Integration of metabolism*



Biochemistry III: Metabolism
Abilene Christian University
Spring 2017

Chem 456
2 credit hours

MW 8:00-8:50
Onstead Science Center 258



Dr. Autumn Sutherlin, Professor of Biochemistry

Office: Onstead Science Center 277c

Office phone: 674-6511

Lab: Onstead Science Center 281

E-mail: autumn.sutherlin@acu.edu

Office Hours: TR 1:30-5:00

ACU Mission: To educate students for Christian service and leadership throughout the world.

College of Arts and Sciences Mission: The College of Arts and Sciences engages students with humanity's greatest ideas to create understanding, apply insights, and serve the world as Christian thinkers and problem solvers.

Department Mission: To prepare students for careers in chemistry, biochemistry, chemical education, and health professions by displaying high professional standards and by modeling Christian values, leadership, and service.

A Christian Perspective: "I praise you because I am fearfully and wonderfully made; your works are wonderful, I know that full well." Psalm 139:14 The intricate details of metabolism show how truly amazing life is. This course will give the students a deeper appreciation of how wonderfully made we are.

Course Description: Biochemistry III presents the biochemistry of metabolic pathways with an emphasis on integration and regulation.

Prerequisite: At least a C in CHEM 453/ BIOL 472 Biochemistry I: Fundamentals of Biochemistry.

Course Purpose and Audience: This course is designed to prepare upper level biochemistry, biology, and chemistry majors for graduate school, professional school in human or veterinary medicine or pharmacy, or the work force in health and biotechnology related fields.

Texts:

Required: "Biochemistry, 8th Ed." by Jeremy Berg, John Tymoczko, and Lubert Stryer. W.H. Freeman and Company: New York, 2015

Optional: "Student Companion to Accompany Biochemistry, 8th Ed." by Richard Gumpert, Frank Deis, Nancy Counts Gerber, and Roger Koeppe II. W.H. Freeman and Company: New York, 2015.

Other Required Materials: iPhone®, iPodTouch®, iPad®, other tablet or smart phone with ResponseWare App from Turning Point registered at student.turningtechnologies.com. Access to Canvas.

Other Resources: bcs.whfreeman.com/berg8e

Journal Articles: Five journal articles will be assigned during the semester that relate to the metabolic pathways being discussed in class. Links to articles will be provided in Canvas. Students will be assigned to online discussion groups in which they will work together to answer questions about the journal article. The articles for this semester will be:

1. Jin, E.S.; Sherry, A.D; Malloy, C.R. Interaction between the pentose phosphate pathway and gluconeogenesis from glycerol in the liver. *JBC* **2014**, *289*, 32593–32603.
2. Zhang, M.M.; Tsou, L.K.; Charron, G.; Raghavan, A.S.; and Hang, H.C. Tandem fluorescence imaging of dynamic S-acylation and protein turnover. *PNAS* **2010**, *107*, 8627-8632.
3. Liu, X; Pavlovsky, A.G.; Viola, R.E. The structural basis for allosteric inhibition of a threonine-sensitive aspartokinase. *JBC* **2008**, *283*, 16216–16225.
4. Strijbis, K.; van Roermund; C.W., van den Burg, J. van den Berg, M., Hardy: G.P.M, Wanders, R.J.A; Distel, B; Contributions of carnitine acetyl-transferases to intracellular acetyl unit transport in *Candida albicans*. *JBC* **2010**, *285*, 24335–24346.
5. Guttman, M.; Prieto, J.H; Croy, J.E.; Komives, E.A. Decoding of Lipoprotein-Receptor Interactions: Properties of ligand binding modules governing interactions with apolipoprotein E. *Biochemistry* **2010**, *49*, 1207–1216

Metabolic Pathway Project: Students in groups will produce a 4-5 minute video on a metabolic pathway not discussed in class. The video will cover an overview of the pathway, its regulation and how it integrates into the overall metabolism of the cell. More information on this assignment will be given in class.

Participation: The participation grade will be based on regular answering in-class quizzing using iDevices, working in groups, and contributing to peer instruction during class. You may lose participation points by missing or being late to class on a regular basis, talking excessively to neighbors during class, disrupting class, and using your iDevice or cell phone at non-designated times (texting, playing games, etc.)

Exams: Three exams will be given covering Modules I, II, and III. Attendance is required at exams. The professor must be notified **BEFORE** the exam if you will not be able to attend. Make-up exams will only be given for excused absences (see attendance policy.)

Final: The final exam will be a comprehensive final covering Modules I, II, and III. The professor must be notified **BEFORE** the exam if you will not be able to attend. A make-up final will only be given for excused absences (see attendance policy.)

Grading:

Summary of Activities:

3 Exams	52.5%
Final	17.5%
Metabolic Pathway Project	15%
Quizzes	5%
Journal Articles	5%
Homework & Participation	5%
Total	100%

Grade Distribution:

A	90.00 – 100 %
B	80.00 – 89.99%
C	70.00 – 79.99%
D	60.00 – 69.99%
F	59.99% and below

Academic Integrity: Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God. Academic misconduct includes, but is not limited to, the following: 1) Failure to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submission of papers or projects obtained from another source (e.g., research service or club paper file) as one's own, and 3) Falsifying information orally or in writing.

The first instance of academic misconduct will result in a 0 for the assignment. A second incident will result in an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link: <http://www.acu.edu/campusoffices/studentlife/judicialDocuments/AcademicIntegrityPolicy.pdf>.

The Americans with Disabilities Act (ADA): Abilene Christian University is dedicated to removing barriers and opening access for students with disabilities in compliance with ADA and Section 504 of the Rehabilitation Act. The Alpha Scholars Program facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Alpha Scholars Program, and you must complete a specific request for each class in which you need accommodations. If you have a documented disability and wish to discuss academic accommodations, please call the Alpha Scholars Program office directly at 325-674-2667.

Dress Code: Students should conform to the dress code as outlined in the Student Handbook. Students wearing inappropriate attire will be asked to leave class.

Course Content

Module I:

- Review of Glycolysis and Gluconeogenesis
- Overview of Signal Transduction
- Light Reactions Photosynthesis
- Calvin Cycle and Pentose Phosphate Pathway
- Glycogen Metabolism

Module II:

- Protein Turnover and Amino Acid Catabolism
- Amino Acid Biosynthesis
- Nucleic Acid Biosynthesis

Module III:

- Fatty Acid Metabolism
- Membrane and Steroid Synthesis
- Integration of Metabolism

Proposed Schedule

Week	Date	Chapter		Quiz Due	Paper Discussion Due
		16 and 17			
1	18-Jan	17	Review of Glycolysis, Gluconeogenesis, and TCA		
2	23-Jan	14	Overview of Signal Transduction		
	25-Jan	19	Light Reactions of Photosynthesis		
3	30-Jan	19	Light Reactions of Photosynthesis	1	
	1-Feb	20	Calvin Cycle		
4	6-Feb	20	Pentose Phosphate Pathway		Paper 1
	8-Feb	21	Glycogen		
5	13-Feb	21	Glycogen	2	
	15-Feb	21	Glycogen		
6	20-Feb		Exam I		
	22-Feb	23	Protein Turn over and Amino Acid Catabolism		
7	27-Feb	23	Protein Turn over and Amino Acid Catabolism	3	
	1-Mar	23	Protein Turn over and Amino Acid Catabolism		
8	6-Mar	24	Amino Acid Biosynthesis		Paper 2
	8-Mar	24	Amino Acid Biosynthesis		
Spring	13-Mar				
Break	15-Mar				
9	20-Mar	24	Amino Acid Biosynthesis	4	
	22-Mar	25	Nucleic Acid Biosynthesis		
10	27-Mar	25	Nucleic Acid Biosynthesis		Paper 3
	29-Mar	25	Nucleic Acid Biosynthesis		
11	3-Apr		Exam II	5	
	5-Apr	22	Fatty Acid Metabolism		
12	10-Apr	22	Fatty Acid Metabolism		Paper 4
	12-Apr	22	Fatty Acid Metabolism		
13	17-Apr	26	Membrane and Steroid Synthesis	6	
	19-Apr	26	Membrane and Steroid Synthesis		
14	24-Apr	26	Membrane and Steroid Synthesis		Paper 5
	26-Apr	27	Integration of Metabolism		
15	1-May	27	Integration of Metabolism	7	
	3-May		Project Presentations		
16	Final		Final Exam		

ABILENE CHRISTIAN UNIVERSITY

LIBRARY

M E M O R A N D U M

DATE: December 10, 2015
TO: Dr. Autumn Sutherlin
FROM: Mark McCallon, Associate Dean for Library Resources
RE: Course Application for CHEM 456 – Biochemistry III - Metabolism

After reviewing the course application and syllabus, the library can adequately support the proposed course. Please contact Jasmine Hoover (jrh15c@acu.edu), librarian liaison to the Department of Chemistry and Biochemistry regarding specific resources that the library needs to purchase for future revisions to the course. Thank you for letting us examine the course proposal.

December 9, 15

Dr. Autumn Sutherlin
Onstead Science Center 277C
(325)674-6511
autumn.sutherlin@acu.edu

Dear Dr. Sutherlin,

Thank you for the submission of CHEM456: Biochemistry III: Metabolism. Based on ACU course application guidelines, I find that the syllabus meets the university requirements. I have a few fairly minor formatting suggestions:

- When the abbreviation OSC is used the first time (towards the top of the page), consider spelling it out.
- Consider using some method (indentation, for instance) to differentiate headings and subheadings (for instance, for the "texts" section). What you did for the "grading" section works very well. Perhaps you can use the same method.
- There are some extra line spaces you could remove, for instance, before "office hours" and "academic integrity".
- I saw that the schedule is in another file. You might want to add a sentence in the syllabus explaining where to find the schedule, if you posted it in Canvas. When finalized, you might also consider changing it to PDF file to preserve the format, as the dates in Excell do not display properly when I first opened it.

These are small changes that can be easily made yourself. There is no need to bring it back to the Adams Center for further review.

This letter is not meant to be a final approval in the course application process. It is intended as a reference for the council members, who may have questions or comments of their own. If there is anything else we can do to help you, please feel free to let me know.

Sincerely yours,



Director of Instructional Design
Adams Center for Teaching and Learning
Abilene Christian University

ACU Syllabus Checklist

Revised on July 15, 2014 based on ACU New Course Application v10.5.

Course Title and Number

CHEM456: Metabolism

Reviewer

Berlin Fang

Developer

Dr. Autumn Sutherlin

About the course

- ☒ Course number and title
- ☒ Credit hours
- ☒ Semester and year
- ☒ Meeting time and place
- ☒ Prerequisites/co-requisites

About the instructor(s)

- ☒ Name and title or rank
- ☒ Office location
- ☒ Contact information
- ☒ Office hours/contact expectations

Mission statements

- ☒ ACU mission statement
- ☒ College mission statement
- ☒ Department mission statement
- ☒ Personal mission statement (optional)

Unique Christian Perspective

- ☒ Description of how learning and Christian faith are integrated in the course

Course Content

- ☒ Catalog description

- ☒ Intended audience
- ☒ Outline of topics

Teaching/Learning Methods and Format of Class Sessions

- ☒ Description of the types of activities students should expect in the course

Materials

- ☒ Required and optional materials, including textbooks, etc.

Learning Objectives/Competencies

- ☒ Specific competencies stated in measurable terms
- ☒ Assignments or instruments that will be used to assess the competencies.

Assessment/Grading Criteria

- ☒ Complete and accurate details of factors and elements that will comprise the final grade
- ☒ Weight or point value of all graded elements
- ☒ Grading scale with clear expectations for grades
- ☐ Extra credit opportunities (optional)

University Policies

- ☒ Special needs policy -ADA
- ☒ Academic integrity policy (recommended)
- ☐ Title IX policy (recommended)

Course Policies

Expectations and consequences regarding:

- ☒ Participation
- ☒ Attendance and tardiness
- ☐ Course specific academic integrity policy (optional)

Calendar

(Note: Calendar is not required for Course Application, but it must be included in all syllabi distributed to students.)

- ☒ Exam dates
- ☒ Assignments
- ☒ Due dates and other deadlines (and late assignment/exam policy)
- ☒ Schedule of readings and topics
- ☒ Statement to reserve the right to modify the calendar as necessary

Any comments?

A large, empty rectangular text box with a thin black border, intended for the user to enter their syllabus checklist information.

Submit

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