

CATALOG YEAR 2006-2007
(Please use separate form for each add/change)

COLLEGE/SCHOOL : _____ College of Arts & Sciences _____

Current Catalog Page(s) Affected _____ pg. 260 _____

Course: Add: X Delete: _____
(check all that apply) Change: Number _____ Title _____ SCH _____
Description _____ Prerequisite _____

If new, provide Course Prefix, Number, Title, SCH Value, Description, prerequisite, and lecture/lab hours if applicable. If in current catalog, copy and paste the text from the _____ and indicate changes in red.

BIOL 5452 Advanced Biochemistry. Four semester hours. (SP) A detailed study, using primary literature sources, of carbohydrate, amino acids, nucleic acids, and lipid metabolic pathways. Special attention is given to human metabolism in health and disease. Prerequisite: one semester (3 SCH or more) of biochemistry for majors or permission of instructor. (Cross-listed with CHEM 4452)

Justification: New course to support the Masters of Science in Biology program.

Program: Add: _____ Change: _____ Attach new/changed Program of Study description and 4-year plan. If in current catalog, copy and paste the text from the _____ and indicate changes in red.

Minor: Add: _____ Delete: _____ Change: _____ Attach new/changed minor. If in current catalog, copy and paste the text from the _____ and indicate changes in red.

Faculty: Add: _____ Delete: _____ Change: _____ Attach new/changed faculty entry. If in current catalog, copy and paste the text from the _____ and indicate changes in red.

College Introductory Pages: Add information: _____ Change information: _____ Attach new/changed information. If in current catalog, copy and paste the text from the _____ and indicate changes in red.

Approvals:	Signature	Date
Chair Department Curriculum Committee	_____	_____
Chair Department	_____	_____
Chair College Curriculum Committee	_____	_____

Dean

TEXAS A&M INTERNATIONAL UNIVERSITY
DEPARTMENT OF BIOLOGY and CHEMISTRY

BIOL5452

ADVANCED BIOCHEMISTRY

SPRING SEMESTER

SCHEDULE

LOCATION

Instructor: Mario G. García-Ríos

Office: LBVSC379C

E-mail: mgarcia@tamiu.edu

Office Hours:

Course Web Pages

1. WebCT site. <http://www.tamiu.edu/login.html>. This is the main site for course support. You will need a username and a password to access. Please see me if you have problems connecting.
2. Older site. <http://www.tamiu.edu/~mgarcia/Bioch2Syll.html>. Contains syllabus, references, and study materials:

I. COURSE OBJECTIVE

We will discuss recent research reports dealing with modern issues of biochemistry, emphasizing central and secondary metabolic routes

We aim to study and analyze current trends in biochemistry, with a particular emphasis on human aspects. Topics will be presented in the context of current scientific literature. I expect each student to critically read all assigned journal articles, as well as the topic synopsis. A basic understanding of the key ideas presented in each paper will be the basis for your grade.

II. LEARNING OUTCOMES

By the end of the semester you should be able to:

1. Explain how central metabolic routes function in normal cells.
2. Identify key metabolites in carbohydrate, lipid and amino acid biosynthesis.
3. Determine how metabolic disorders affect whole organism physiology
4. Suggest potential approaches to repair non-functional central metabolic pathways.

III. COURSE GRADING POLICY

We will discuss thirteen different topics. Each topic will be covered by critically reading one to four journal articles. You are expected to write a critical summary for each of the topics. Each summary must include the following: 1) Statement indicating a major finding of the paper, 2) Alternate possible conclusion(s), 3) Potential pitfalls or oversights, and 4) Suggestions for future direction. Your grade will be computed as follows:

1. Critical Summaries (12)	30%
2. Central Concepts Exam I	20%
3. Central Concepts Exam II	20%
4. Final Exam	20%
4. Participation	10%

E-mail communication will be important. Please make sure that I have your working e-mail address. No exceptions. Announcements, lecture notes, and other course materials will occasionally be distributed electronically.

III. TEXT

There is no main textbook for this course. Any recent biochemistry text can be used as reference and to aid you in understanding the papers. I will provide you with pertinent background information as well as with a list of journal articles. You are responsible for locating the papers and obtaining the full text.

IV. ATTENDANCE and PARTICIPATION

Regular attendance and thoughtful, informed participation in class discussions is expected. You should read the appropriate material prior to attending lecture. This will ensure a better understanding of the ideas presented in the classroom. Special reading assignments will be posted on the course web site, and may include material not present in your text. You are expected to be present for every class meeting. **No** make-ups of exams will be allowed except in the case of verifiable serious illness or other similar situation.

V. UNITS OF INSTRUCTION

1. Course schedule (subject to adjustments):

<u>Topic</u>	<u>Date</u>	<u>Readings</u>
Introduction		
The Universal Nature of Biochemistry		Papers 0, 18
Biochemical Evolution		Papers 15, 17
Statistical Analysis of Sequences		Papers 2, 9
Catalytic Strategies		Papers 6, 11, 16
Regulatory Strategies		Papers 8, 10, 12
EXAM I		
Information Metabolism		Papers 7, 13
Fatty Acid Metabolism		Papers 3, 4, 21, 22
Amino Acid Catabolism		Papers 1, 5
Biosynthesis of Amino Acids		Paper 14
Biosynthesis of Nucleotides		Paper 19
EXAM II		
Biosynthesis of Membrane Lipids		Papers 21, 22
Nucleic Acids		Paper 20

VI. READINGS LIST

0. **Kornberg, A.** 1987. The Two Cultures: Chemistry and Biology. *Biochemistry* 26:6888-6891.
1. **Alam, A., M. Y. Braun, F. Hartgers, S. Lesage, L. Cohen, P. Hugo, F. Denis, and R. P. Sekaly.** 1997. Specific activation of the cysteine protease CPP32 during the negative selection of T cells in the thymus. *J Exp Med* 186:1503-12.
2. **Altschul, S. F., T. L. Madden, A. A. Schaffer, J. Zhang, Z. Zhang, W. Miller, and D. J. Lipman.** 1997. Gapped BLAST and PSI-BLAST: a new generation of protein database search programs. *Nucleic Acids Res* 25:3389-402.
3. **Athenstaedt, K., and G. Daum.** 1999. Phosphatidic acid, a key intermediate in lipid metabolism. *Eur J Biochem* 266:1-16.
4. **Athenstaedt, K., S. Weys, F. Paltauf, and G. Daum.** 1999. Redundant systems of phosphatidic acid biosynthesis via acylation of glycerol-3-phosphate or dihydroxyacetone phosphate in the

- yeast *Saccharomyces cerevisiae*. *J Bacteriol* **181**:1458-63.
5. **Cohen, G. M.** 1997. Caspases: the executioners of apoptosis. *Biochem J* **326 (Pt 1)**:1-16.
 6. **Eisenberg, D., H. S. Gill, G. M. Pfluegl, and S. H. Rotstein.** 2000. Structure-function relationships of glutamine synthetases. *Biochim Biophys Acta* **1477**:122-45.
 7. **Farooqi, I. S., S. A. Jebb, G. Langmack, E. Lawrence, C. H. Cheetham, A. M. Prentice, I. A. Hughes, M. A. McCamish, and S. O'Rahilly.** 1999. Effects of recombinant leptin therapy in a child with congenital leptin deficiency. *N Engl J Med* **341**:879-84.
 8. **Halbleib, C. M., and P. W. Ludden.** 2000. Regulation of biological nitrogen fixation. *J Nutr* **130**:1081-4.
 9. **Heger, A., and L. Holm.** 2000. Rapid automatic detection and alignment of repeats in protein sequences. *Proteins* **41**:224-37.
 10. **Hurley, J. H.** 1999. Structure, mechanism, and regulation of mammalian adenylyl cyclase. *J Biol Chem* **274**:7599-602.
 11. **Jeltsch, A., J. Alves, G. Maass, and A. Pingoud.** 1992. On the catalytic mechanism of EcoRI and EcoRV. A detailed proposal based on biochemical results, structural data and molecular modelling. *FEBS Lett* **304**:4-8.
 12. **Kemp, G. J.** 2000. Studying metabolic regulation in human muscle. *Biochem Soc Trans* **28**:100-3.
 13. **Krieger, M.** 1998. The "best" of cholesterol, the "worst" of cholesterol: a tale of two receptors. *Proc Natl Acad Sci U S A* **95**:4077-80.
 14. **Levy, H. L.** 1999. Phenylketonuria: old disease, new approach to treatment. *Proc Natl Acad Sci U S A* **96**:1811-3.
 15. **Levy, M., and S. L. Miller.** 1998. The stability of the RNA bases: implications for the origin of life. *Proc Natl Acad Sci U S A* **95**:7933-8.
 16. **LiCata, V. J., D. S. Burz, N. J. Moerke, and N. M. Allewell.** 1998. The magnitude of the allosteric conformational transition of aspartate transcarbamylase is altered by mutations. *Biochemistry* **37**:17381-5.
 17. **Nelson, K. E., M. Levy, and S. L. Miller.** 2000. Peptide nucleic acids rather than RNA may have been the first genetic molecule. *Proc Natl Acad Sci U S A* **97**:3868-71.
 18. **Pace, N. R.** 2001. The universal nature of biochemistry. *Proc Natl Acad Sci U S A* **98**:805-8.
 19. **Turner, M. A., A. Simpson, R. R. McInnes, and P. L. Howell.** 1997. Human argininosuccinate lyase: a structural basis for intragenic complementation. *Proc Natl Acad Sci U S A* **94**:9063-8.
 20. **Wales, M. E., L. L. Madison, S. S. Glaser, and J. R. Wild.** 1999. Divergent allosteric patterns verify the regulatory paradigm for aspartate transcarbamylase. *J Mol Biol* **294**:1387-400.
 21. **Wanders, R. J., E. G. van Grunsven, and G. A. Jansen.** 2000. Lipid metabolism in peroxisomes: enzymology, functions and dysfunctions of the fatty acid alpha- and beta-oxidation systems in humans. *Biochem Soc Trans* **28**:141-9.
 22. **Zhang, Y. M., M. S. Rao, R. J. Heath, A. C. Price, A. J. Olson, C. O. Rock, and S. W. White.** 2001. Identification and analysis of the acyl carrier protein (ACP) docking site on beta-ketoacyl-ACP synthase III. *J Biol Chem* **276**:8231-8.

VII. UNIVERSITY REGULATIONS

Classroom Behavior

The College of Arts and Sciences encourages classroom discussion and academic debate as an essential intellectual activity. It is essential that students learn to express and defend their beliefs, but it is also essential that they learn to listen and respond respectfully to others whose beliefs they may not share. The College will always tolerate diverse, unorthodox, and unpopular points of view, but it will not tolerate condescending or insulting remarks. When students verbally abuse or ridicule and intimidate others whose views they do not agree with, they subvert the free exchange of ideas that should characterize a university classroom. If their actions are deemed by the professor to be disruptive, they will be subject to appropriate disciplinary action, which may include being involuntarily withdrawn

from the class.

Copyright Restrictions

The Copyright Act of 1976 grants to copyright owners the exclusive right to reproduce their works and distribute copies of their work. Works that receive copyright protection include published works such as a textbook. Copying a textbook without permission from the owner of the copyright may constitute copyright infringement. Civil and criminal penalties may be assessed for copyright infringement. Civil penalties include damages up to \$100,000; criminal penalties include a fine up to \$250,000 and imprisonment.

Copyright laws do allow students and professors to make photocopies of copyrighted materials under strict conditions. You may not copy most, much less all, of a work, but you may copy a limited portion of a work, such as an article from a journal or a chapter from a book. These copies must be for your own personal academic use or, in the case of a professor, for personal, limited classroom use. In general, the extent of your copying should not suggest that the purpose or the effect of your copying is to avoid paying for the materials. And, of course, you may not sell these copies for a profit. Thus, students who copy textbooks to avoid buying them or professors who provide photocopies of textbooks to enable students to save money are both violating the law.

Plagiarism and Cheating

Plagiarism is the presentation of someone else's work as one's own. Recently, the Internet has complicated the picture. Getting something from the Internet and presenting it as one's own is still plagiarism. Copying another student's paper or a portion of the paper - is usually called "copying". Neither plagiarism nor copying will be tolerated. Should a faculty member discover that a student has committed plagiarism, the students will receive a grade of 'F' in that course and the matter will be referred to the Executive Director of Student Life for possible disciplinary action.

Students with Disabilities

Texas A&M International University seeks to provide reasonable accommodations for all qualified persons with disabilities. This University will adhere to all applicable federal, state, and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal education opportunity. It is the student's responsibility to register with the Director of Student Counseling and to contact the faculty member in a timely fashion to arrange for suitable accommodations.

Incompletes

Incompletes are discouraged and are assigned only under extenuating circumstances. In fairness to those students who complete the course as scheduled, under no circumstances will an Incomplete ("I") be changed to an "A" unless the student has experienced a death in the immediate family or has a written medical excuse from a physician.

Independent Study Courses

Independent Study (IS) courses are offered only under exceptional circumstances. Required courses intended to build academic skills may not be taken as IS (e.g., clinical supervision and internships). No student will take more than one IS course per semester. Moreover, IS courses are limited to seniors and graduate students. Summer IS course must continue through both summer sessions.

Student Responsibility For Dropping a Course

"It is the responsibility of the STUDENT to drop the course before the drop date. Faculty are not responsible for dropping students who suspend class attendance".

Final Examination

Final Examinations must be comprehensive and must be given on the day specified.

Student E-mail Address

All students must obtain a TAMU e-mail address

VIII. IMPORTANT DATES

Month, Day, is the last day to drop the class without receiving a grade.

The final exam is scheduled for .