Syllabus
General Biochemistry II
BCH 4054, Section 01
Spring 2009, Florida State University

Instructor: Professor Penny J. Gilmer
Office: 216 DLC (Dittmer Laboratory of Chemistry)
Department: Chemistry and Biochemistry
Phone: (850) 644-4026
Email: gilmer@chem.fsu.edu
URL: http://garnet.acns.fsu.edu/~pgilmer/index.html
Office hrs. Tu 9:00 – 10:30 AM; W: 1:00 – 2 PM

Table of Contents
Graders ................................................................................................................................. 1
Classroom ............................................................................................................................ 1
Office Hours .......................................................................................................................... 1
Course Description ............................................................................................................... 2
  Textbooks .......................................................................................................................... 2
  PRS ...................................................................................................................................... 2
  Collaborative groups ......................................................................................................... 2
Quizzes, Hour Examinations and Final Examination ............................................................. 3
Overall evaluation ............................................................................................................... 3
Posting your goals for bonus points .................................................................................... 3
Attendance .......................................................................................................................... 4
Academic Honor Code ....................................................................................................... 4
Disabilities/ADA .................................................................................................................. 4

Graders
We have three graders for this class. Note that more info can be found on them under Staff Information on Blackboard:
   Chi Ben .......................................................... cb05g@fsu.edu
   Zahraa Khamis ................................................. zik06@fsu.edu
   Kyle Noble ..................................................... kan05c@fsu.edu

Classroom
Our class will meet MWF from 11:15 AM- 12:05 PM in 255 Fisher Lecture Hall (FLH).

Office Hours
I will meet for scheduled office hours, as listed above, and as posted under “Staff Information” on our BlackBoard Web site. I will make every possible effort to meet with you outside of office hours, if
necessary, but only if you schedule an appointment. Please email me to set up all appointments as that facilitates getting into my Palm Pilot. DO NOT just stop by outside of scheduled office hours.

**Course Description**

This is the second semester of a two-semester sequence that introduces the general concepts of biochemistry to the advanced undergraduate or beginning graduate student. I will teach this course with an emphasis on chemical and biochemical principles and use active learning in the classroom, including the use of the PRS (Personal Response System). The focus is on *biosynthesis and biodegradation* of carbohydrates, lipids, and nucleic acids, and the *exquisite regulation* of those processes. I expect you to be able to apply the knowledge, so try to understand the material rather than memorizing it. The course includes a tremendous amount of material; DO NOT FALL BEHIND in your reading or in studying.

**Textbooks**

The required textbook is *Biochemistry*, by R. H. Garrett & C. M. Grisham (updated 3rd ed.). I also strongly suggest that you purchase *Instant Notes in Biochemistry* by B. D. Hames and N. M. Hooper (3rd ed.), which is available at the FSU bookstore or on the Internet. Many students have told me that this book was very useful in studying for the course and for MCAT.

**PRS**

This year I will be using the radiofrequency-mode PRS (personal response system). These are different than the ones used several years ago, which sent each student’s message by a light-emitting diode. Therefore, you should carry your PRS with you every day, as you do your cell phone and calculator. The cost is ~$50 each, and the FSU bookstore will purchase them for $25 at the end of the semester. With time the technology will change, and in the future, however, you not be able to sell the PRS.

I will use the PRS for attendance (1 point each day I do electronic attendance) but mainly for asking biochemistry questions during class (2 points per question with the right answer). You may only answer the questions with your own PRS module. In the past, I had trouble with students using a friend’s PRS system and entering attendance or answers for the friend, when the friend was absent from class. I will have ways to check on this matter, so only use your own PRS module. Since the PRS questions are worth points, we must all be careful that no one cheats. If I catch you doing otherwise, you will get zero credit for the day. The total number of points possible will be 100.

**Collaborative groups**

I have found through my own research in the biochemistry classroom that organizing students into collaborative groups helps students learn. I will organize you into collaborative groups of three to four students. Each group will have a group site on Blackboard, so you can communicate easily among yourselves. I encourage you to sit together as a group in class, and I do allow you to talk with the PRS questions, so you can use the language of science with each other, in class, on the Web, and in person. Your using the language of science helps in your learning. Once drop-and-add is done, I will provide a slip of paper so you may indicate your group members. So be thinking about your group members during this first week of classes.
Quizzes, Hour Examinations and Final Examination

There will be one practice quiz as the first quiz, followed by five in-class quizzes, each worth 25 points. The lowest score for the five recorded quiz grades will be dropped, with no make-ups.

There will be four hourly examinations, each worth 100 points, and the lowest score will be dropped, with no make-ups. There will be one cumulative final examination, worth 200 points. In special cases, if you know you need to miss class, for instance for an interview, you could arrange with me to take the quiz early (but not late).

Here is the final examination schedule. The location for the final examination is our usual classroom.

<table>
<thead>
<tr>
<th>Date of final examination</th>
<th>Time of final examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday, April 30th</td>
<td>12:30 PM – 2:30 PM</td>
</tr>
</tbody>
</table>

Some of my previous hour examinations and quizzes from BCH 4054 are posted in a folder in Blackboard under Course Library to help you prepare for these quizzes and hour exams. Once you have tried to answer the questions on the practice tests, I will let you see the answers. Earlier semester’s final examination will not be posted.

Overall evaluation

I add the scores from the three examinations (3 x 100), the final examination (200), the four highest recorded quiz grades (100 total), and 100 points from PRS. Also you can earn up to 30 bonus points for posting your goals three times during the semester (thereby making 730 the maximum number of points available). Your total will be summed and divided by 7 to obtain your final score (out of 100 points). If you are near the borderline between two grades, excellent attendance could boost you to the next grade. I use the +/- letter grade system.

Minimum Grade Scale:

Tentative examination dates are given in the Lecture Schedule. Note that these dates may change, and any deviation from these dates will be announced in class.

Posting your goals for bonus points

You may earn 10 bonus points each time you post your goals at the beginning, midway, and at the end of the course. You must have **at least a paragraph** each time, and you **must leave the earlier postings still on the site**. Your stated goal **cannot** be that you want to receive an A in the course. You need to **state your learning goals**. I ask you to do this as research indicates that those who reflect on their goals regularly are more likely to achieve them. Also your postings inform me, your instructor, on your interests and goals, and I can relate to these goals in my lectures.

You will post your goals on Blackboard under Student Tools at your Homepage site. You can post a digital photo too (but be sure the file is small in dimensions, like 2” square is great). The posting of your photograph helps me to learn your name. Be sure to save by uploading your entry, at the bottom of the
You can see how I view your posting, if you go to Communication and then to Roster and enter and submit your name. Deadlines at midnight for posting goals are as follows:

<table>
<thead>
<tr>
<th>Goal #</th>
<th>Deadline date for posting goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning</td>
<td>Wednesday, January 14</td>
</tr>
<tr>
<td>Midway</td>
<td>Friday, February 20</td>
</tr>
<tr>
<td>End</td>
<td>Wednesday, April 22</td>
</tr>
</tbody>
</table>

Attendance

Please carry your Personal Response System (PRS) with you as I may take attendance using the PRS and will use the PRS system regularly. *Only click attendance or answers for yourself.* We will use the PRS to help us discover your understanding of certain topics. Experience of teaching BCH4053 and 4054 over the past decade shows a strong correlation between class attendance and final grade. In other words, your final grade will likely be significantly higher if you attend class on every scheduled period. Also excellent attendance may raise you to a higher grade, if you are at the interface between two grades at the end of the semester.

Academic Honor Code

I expect each of you to follow the academic honor code as outlined in the Student Handbook and available on the web: http://www.fsu.edu/Books/Student-Handbook/2003codes/honor.html. I also expect that you will only use your own PRS and no one else will use your PRS to enter attendance or answers to other PRS questions during class.

Essentially, you are expected (1) to uphold the highest standards of academic integrity in your own work, (2) to refuse to tolerate violations of academic integrity in the University community, and (3) to foster a high sense of integrity and social responsibility on the part of the University community.

Disabilities/ADA

Students with disabilities needing academic accommodations should register with the Student Disability Resource Center <SDRC@admin.fsu.edu> and must notify me in the first week of class.
# Tentative Lecture with Quiz and Examination Schedule

<table>
<thead>
<tr>
<th>Lect #</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>G&amp;G Reading</th>
<th>H&amp;H page numbers</th>
<th>Other</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>W</td>
<td>01/07</td>
<td>Introduction to course</td>
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</tr>
<tr>
<td>2</td>
<td>F</td>
<td>01/09</td>
<td>Overview of metabolism</td>
<td>Chap 17</td>
<td>30-36, 44-45, 88-89</td>
<td>Dr. Logan teaches today</td>
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<tr>
<td>3</td>
<td>M</td>
<td>01/12</td>
<td>Review of glycolysis and its regulation</td>
<td>Chap 17</td>
<td>30-36, 44-45, 88-89</td>
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<tr>
<td>4</td>
<td>W</td>
<td>01/14</td>
<td>Review of glycolysis and its regulation Practice quiz</td>
<td>Chap 18</td>
<td></td>
<td>Posting of your own initial goals</td>
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<tr>
<td>5</td>
<td>F</td>
<td>01/16</td>
<td>Practice quiz and Gluconeogenesis and its regulation</td>
<td>Chap 22</td>
<td></td>
<td>Practice quiz</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>01/19</td>
<td>Martin Luther King, Jr. holiday</td>
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<tr>
<td>6</td>
<td>W</td>
<td>01/21</td>
<td>Gluconeogenesis and its regulation</td>
<td>Chap 22</td>
<td>315-322</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>01/23</td>
<td>Glycogen metabolism</td>
<td>Chap 22</td>
<td>327-334</td>
<td></td>
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<tr>
<td>8</td>
<td>M</td>
<td>01/26</td>
<td>Hour Examination 1</td>
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<td>Exam 1</td>
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<td>9</td>
<td>W</td>
<td>01/28</td>
<td>Glycogen metabolism</td>
<td>Chap 22 &amp; pp. 486-491 in Ch. 15</td>
<td>327-334</td>
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<tr>
<td>10</td>
<td>F</td>
<td>01/30</td>
<td>Glycogen metabolism</td>
<td>Chap 22 &amp; pp. 486-491 in Ch. 15</td>
<td>327-334</td>
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<tr>
<td>11</td>
<td>M</td>
<td>02/02</td>
<td>Pentose phosphate pathway and its regulation</td>
<td>Chap 22</td>
<td>323-326</td>
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<td>12</td>
<td>W</td>
<td>02/04</td>
<td>Quiz 1 and Pentose phosphate pathway and its regulation</td>
<td>Chap 22</td>
<td>323-326</td>
<td>Quiz 1</td>
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<td>13</td>
<td>F</td>
<td>02/06</td>
<td>Regulation of glucose metabolism and blood glucose</td>
<td>Chap 22</td>
<td>314, 317, 320-322</td>
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<td>14</td>
<td>M</td>
<td>02/09</td>
<td>TCA and its regulation</td>
<td>Chap 19</td>
<td>367-371</td>
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<td>Chap 19</td>
<td>367-371</td>
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<td>Date</td>
<td>Event Description</td>
<td>Chapter</td>
<td>Pages</td>
<td>Notes</td>
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<td>Fatty acid catabolism</td>
<td>Chap 23</td>
<td>335-337, 339-345</td>
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<td>02/18</td>
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<td>Chap 23</td>
<td>339-345</td>
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<td>19</td>
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<td>02/20</td>
<td>Fatty acid catabolism</td>
<td>Chap 23</td>
<td>339-345</td>
<td>Posting of own midway goals</td>
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<td>02/20</td>
<td>Ketone bodies</td>
<td>Chap 23</td>
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<td>310, 344-345</td>
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<td>02/25</td>
<td><strong>Quiz 2 and Fatty acid synthesis</strong></td>
<td>Chap 24.1</td>
<td>346-351</td>
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<td>02/27</td>
<td>Electron transport</td>
<td>Chap 20</td>
<td>372-383</td>
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<td>23</td>
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<td>03/02</td>
<td>Electron transport and ATP synthesis</td>
<td>Chap 20</td>
<td>379-381</td>
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<td>24</td>
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<td>03/04</td>
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<td>25</td>
<td>F</td>
<td>03/06</td>
<td>Lipid biosynthesis, Eicosanoids and COX inhibitors</td>
<td>Chap 24</td>
<td>346-351, 337-338, 353-362</td>
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<td>26</td>
<td>M</td>
<td>03/16</td>
<td>Cholesterol biochemistry Lipoproteins and fat metabolism</td>
<td>Chap 24</td>
<td>357-362, 363-366</td>
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<td>27</td>
<td>W</td>
<td>03/18</td>
<td>Nitrogen fixation</td>
<td>Chap 25</td>
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<td>28</td>
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<td>03/20</td>
<td>Urea cycle</td>
<td>Chap 25</td>
<td>407-412</td>
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<td>29</td>
<td>M</td>
<td>03/23</td>
<td><strong>Quiz 3 and amino acid metabolism</strong></td>
<td>Chap 25</td>
<td>400-405</td>
<td>Quiz 3</td>
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<td>30</td>
<td>W</td>
<td>03/25</td>
<td>Transamination and Errors in amino acid metabolism</td>
<td>Chap 25</td>
<td>406</td>
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<td>31</td>
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<td>03/27</td>
<td>Purine metabolism: Folic acid &amp; methyl transfers</td>
<td>Chap 26</td>
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<td>32</td>
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<td>04/01</td>
<td>Purine biosynthesis</td>
<td>Chap 26</td>
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<td>34</td>
<td>F</td>
<td>04/03</td>
<td>Purine biosynthesis</td>
<td>Chap 26</td>
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<tr>
<td>35</td>
<td>M</td>
<td>04/06</td>
<td>Regulating purine biochemistry: Diseases</td>
<td>Chap 26</td>
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<td>36</td>
<td>W</td>
<td>04/08</td>
<td><strong>Quiz 4 and pyrimidine biochemistry</strong></td>
<td>Chap 26</td>
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<td>Quiz 4</td>
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<td>37</td>
<td>F</td>
<td>04/10</td>
<td>Pyrimidine biochemistry</td>
<td>Chap 26</td>
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<td>40</td>
<td>F</td>
<td>04/17</td>
<td>DNA metabolism: replication, recombination and repair</td>
<td>Ch 28</td>
<td>173-177, 183-187, 188-191</td>
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<tr>
<td>41</td>
<td>M</td>
<td>04/20</td>
<td>Quiz 5 and DNA metabolism: replication, recombination and repair</td>
<td>Ch 28</td>
<td>173-177, 183-187, 188-191</td>
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<td>42</td>
<td>W</td>
<td>04/22</td>
<td>DNA metabolism: replication, recombination and repair</td>
<td>Ch 28</td>
<td>173-177, 183-187, 188-191</td>
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<td>Posting of your own final goals</td>
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<tr>
<td>43</td>
<td>F</td>
<td>04/24</td>
<td>Review for final examination</td>
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<td>Th</td>
<td>04/30</td>
<td>Final Examination, 12:30 PM – 2:30 PM</td>
<td>All chapters</td>
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</table>
US Medical Licensing Examination
Here is a list from the US Medical Licensing Examination Step 1 Exam of the biochemistry and molecular biology topics that medical students need to know at the end of their second year of medical school. These topics are included in BCH 4053 and/or BCH 4054.

Biochemistry and molecular biology

- gene expression: DNA structure, replication, and exchange
  - DNA structure: single- and double-stranded DNA, stabilizing forces, supercoiling
  - analysis of DNA: sequencing, restriction analysis, PCR amplification, hybridization
  - DNA replication, mutation, repair, degradation, and inactivation
  - gene structure and organization; chromosomes; centromere, telomere
  - recombination, insertion sequences, transposons
  - mechanisms of genetic exchange (transformation, transduction, conjugation) cross-over, recombination, linkage
  - plasmids and bacteriophages
- gene expression: transcription (including defects)
  - transcription of DNA into RNA, enzymatic reactions, RNA, RNA degradation
  - regulation: cis-regulatory elements, transcription factors, enhancers, promoters, silencers, repressors, splicing
- gene expression: translation (including defects)
  - the genetic code
  - structure and function of tRNA
  - structure and function of ribosomes
  - protein synthesis
  - regulation of translation
  - post-translational modifications (phosphorylation, addition of CHO units)
  - protein degradation
- structure and function of proteins
  - principles of protein structure and folding
  - enzymes: kinetics, reaction mechanisms
  - structural and regulatory proteins: ligand binding, self-assembly
  - regulatory properties
- energy metabolism (metabolic sequences and regulation) and disorders
  - generation of energy from carbohydrates, fatty acids, and essential amino acids; glycolysis, pentose phosphate pathway, tricarboxylic acid cycle, ketogenesis, electron transport and oxidative phosphorylation, glycogenolysis
  - storage of energy: gluconeogenesis, glycogenesis, fatty acid and triglyceride synthesis
  - thermodynamics: free energy, chemical equilibria and group transfer potential, energetics of ATP and other high-energy compounds
- metabolic pathways of small molecules and associated diseases
  - biosynthesis and degradation of amino acids (e.g., homocystinuria)
  - biosynthesis and degradation of purine and pyrimidine nucleotides (e.g., gout, Lesch-Nyhan syndrome)
  - biosynthesis and degradation of lipids (e.g., dyslipidemias, carnitine deficiency, adrenogenital syndromes)
  - biosynthesis and degradation of porphyrins
- biosynthesis and degradation of other macromolecules and associated abnormalities, complex carbohydrates (e.g., lysosomal storage disease), glycoproteins, and proteoglycans