

[The following pages contain the transcribed evaluations of all 15 students who completed CHEM-643 in the fall of 2003. The evaluations were done outside of class after the students had completed their case studies but before most had their final instructor interview. The course evaluation is very similar to the one used in this course in previous years. The 15 completed evaluations were arbitrarily assigned letters "A" through "O". Individual comments are identified by these letters. Instructor comments are enclosed in brackets.]

## CHEM-643 INTERMEDIARY METABOLISM FINAL COURSE EVALUATION Due Monday, December 8, 2003

**Instructions:** *This is an anonymous evaluation to be completed outside of class. I will use your responses to revise the course before it is offered again. Therefore, please answer the following questions honestly and thoughtfully for the benefit of students who will follow you. Return the completed evaluation before class on Monday, December 8 to 116 Brown Laboratory. Make sure you check-off your name on the course roster there because I have no other way of knowing that you have completed this evaluation. For the narrative part of this evaluation, reread the course syllabus. Please return the Departmental "Short Response Form" course evaluation at the same time. Your responses will be read after the grades have been turned in.*

H. B. White

**(Circle one) I am an [undergraduate (9), graduate (6)] student.**

**1. During the first half of the semester, you worked on 7 different weekly problem sets listed in the table below. Rate each (put the number in the appropriate box) with respect to the following criteria:**

**A. Time devoted to it in hours-per-week outside of class.**

1 (<5)      2 (5-10)      3 (10-15)      4 (15-20)      5 (>20)

Homework Problem Set Assignment (Date Due)	1	2	3	4	5	Ave	SD
Inborn Errors of Metabolism (Sept 10)	1	4	5	4	1	3.00	1.03
Review of Carbohydrate Metabolism (Sept 17)	1	5	5	3	0	2.53	1.31
Lipid Metabolism (Sept 24)	1	6	6	2	0	2.60	0.80
Reactions of HMGCoA (Oct 1)	0	5	6	4	0	2.93	0.77
Lysine Biosynthesis (Oct 8)	2	9	2	2	0	2.27	0.85
Biosynthesis of Essential Amino Acids (Oct 15)	2	7	4	2	0	2.40	0.88
Riboflavin Biosynthesis (Oct 22)	2	6	3	4	0	2.60	1.02

**B. Amount of thought required/intellectual difficulty**

Very challenging    1    2    3    4    5    Trivial

Homework Problem Set Assignment (Date Due)	1	2	3	4	5	Ave	SD
Inborn Errors of Metabolism (Sept 10)	3	4	2	6	0	2.73	1.18
Review of Carbohydrate Metabolism (Sept 17)	5	6	3	0	0	1.73	1.00
Lipid Metabolism (Sept 24)	5	6	4	0	0	1.93	0.77
Reactions of HMGCoA (Oct 1)	6	6	3	0	0	1.83	0.75
Lysine Biosynthesis (Oct 8)	4	4	7	0	0	2.20	0.83
Biosynthesis of Essential Amino Acids (Oct 15)	7	4	4	0	0	1.80	0.83
Riboflavin Biosynthesis (Oct 22)	9	5	1	0	0	1.47	0.62

**C. Interest level**

Very interesting    1    2    3    4    5    Totally uninteresting

Homework Problem Set Assignment (Date Due)	1	2	3	4	5	Ave	SD
Inborn Errors of Metabolism (Sept 10)	6	6	3	0	0	1.80	0.76
Review of Carbohydrate Metabolism (Sept 17)	4	8	2	0	0	1.73	0.92
Lipid Metabolism (Sept 24)	5	7	3	0	0	1.87	0.72
Reactions of HMGCoA (Oct 1)	7	3	3	2	0	2.00	1.10
Lysine Biosynthesis (Oct 8)	4	7	3	1	0	2.07	0.85
Biosynthesis of Essential Amino Acids (Oct 15)	4	7	2	2	0	2.13	0.96
Riboflavin Biosynthesis (Oct 22)	3	4	3	4	1	2.73	1.24

**2. Rate each case study assignments listed in the table below with respect to each of the following items: (Use successive columns for A - E)**

A. Time devoted to it in hours-per-week outside of class.

1 (<5)      2 (5-10)      3 (10-15)      4 (15-20)      5 (>20)

<b>A. Time per week</b>	<b>&lt;5 Hrs</b>	<b>5 to 10</b>	<b>10 to 15</b>	<b>15 to 20</b>	<b>&gt;20 Hrs</b>	<b>Mean</b>	<b>SD</b>
CS #1 Photosynthesis	1	9	3	2	0	2.40	0.80
CS #2 Folate Metabolism	1	7	5	0	2	2.67	1.07
CS #3 Amino Acid Metabolism	10	4	1	0	0	1.40	0.61
CS #4 Biotin	13	2	0	0	0	1.133	0.34

**B. Amount of thought required/intellectual difficulty**

Very challenging    1    2    3    4    5    Trivial

<b>B. Intellectual Challenge</b>	<b>Very Challenging</b>				Trivial	<b>Mean</b>	<b>SD</b>
CS #1 Photosynthesis	9	5	1	0	0	1.47	0.62
CS #2 Folate Metabolism	2	4	9	0	0	2.47	0.72
CS #3 Amino Acid Metabolism	5	7	3	0	0	1.87	0.72
CS #4 Biotin	2	7	4	2	0	2.40	0.88

**C. Interest level**

Very interesting    1    2    3    4    5    Totally uninteresting

<b>C. Level of Interest</b>						<b>Mean</b>	<b>SD</b>
CS #1 Photosynthesis	8	4	3	0	0	1.67	0.79
CS #2 Folate Metabolism	8	4	3	0	0	1.67	0.79
CS #3 Amino Acid Metabolism	3	5	4	3	0	2.47	1.02
CS #4 Biotin	5	7	3	0	0	1.87	0.72

**D. Value in promoting group discussion and interaction**

Excellent    1    2    3    4    5    Poor

<b>D. Value for Discussion</b>	<b>Excellent</b>				<b>Poor</b>	<b>Mean</b>	<b>SD</b>
CS #1 Photosynthesis	8	5	1	1	0	1.67	0.87
CS #2 Folate Metabolism	7	5	3	0	0	1.73	0.77
CS #3 Amino Acid Metabolism	7	7	1	0	0	1.60	0.61
CS #4 Biotin	1	5	4	5	0	2.87	0.96

**E. Provide an overall ranking (1, 2, 3, 4) of the assignments. (Note this is a different scale that used on items A - D.)** If there are any that you feel should **not** be used in future offerings of this course, please put a circle around the rank number(s).

Explain any circled assignment in the space below the table.

<b>E. Ranking</b>	<b>1st</b>	<b>2nd</b>	<b>3rd</b>	<b>4th</b>	<b>Mean</b>	<b>SD</b>
CS #1 Photosynthesis	8	3	1	3	1.93	1.18
CS #2 Folate Metabolism	3	5	3	4	2.53	1.09
CS #3 Amino Acid Metabolism	4	4	7	0	2.20	0.83
CS #4 Biotin	1	5	4	5	2.87	0.96

**2. Consider the following items and rate them with respect to how important they are for success in CHEM-643.**

Item	Extremely Important	Very Important	Reasonably Important	Slightly Important	Not Important	Mean	Std Dev	Q#3
a. Personal Initiative	9	6	0	0	0	1.40	0.49	5
b. Library Research Skills	9	2	3	1	0	1.73	1.00	5
c. Taking Notes in Class	1	3	9	1	1	2.87	0.88	6
d. Writing Skills	4	8	3	0	0	1.93	0.68	1
e. Multidisciplinary Synthesis	9	4	1	1	0	1.60	0.88	7
f. Collaboration with Classmates	7	4	2	2	0	1.93	1.06	7
g. Oral Communication Skills	6	7	1	1	0	1.80	0.83	3
h. Logical Analysis	12	3	0	0	0	1.20	0.40	8
i. Prior Knowledge	2	7	5	1	0	2.33	0.79	2
j. Memorization	0	2	4	7	2	3.60	0.88	1
k. Learning New Information	7	8	0	0	0	1.53	0.50	1
l. Problem Solving Skills	14	0	1	0	0	1.13	0.50	10
m. Conceptualization	12	3	0	0	0	1.20	0.40	8
n. Accessing the Internet	11	3	1	0	0	1.33	0.50	6

**3. Consider the items in question 2 again in relation to other science courses. Circle those items that, in your experience, are more important in CHEM-643 than in most other science courses you have taken. Circle as many items as are appropriate.**

**4. On average, I spent \_\_\_ hours a week on work related to CHEM-643.**

A-O Hr      9   6   8   12   5   17   5   10   5   7   15   10   13   5   12   Ave 9.27   SD 3.90  
 Reported

**For each statement, 6 through 27, put a check in the box that best reflects how strongly you agree or disagree with each.**

Statement	Strongly Agree	Agree	No Opinion/ Undecided	Disagree	Strongly Disagree	Mean	Std Dev
6. The wireless laptop computers were a useful resource in the classroom.	9	5	0	1	0	1.53	0.81
7. I found working on case studies to be a valuable learning experience.	9	5	1	0	0	1.47	0.62
8. I think peer evaluation within groups is a worthwhile activity.	3	6	5	1	0	2.27	0.85
9. Based on things I learned this semester, I would really like to learn more about intermediary metabolism.	10	4	1	0	0	1.40	0.61
10. Instead of case studies and group work in the second half of the course, Dr. White should have lectured for the whole semester.	0	1	2	6	6	4.13	0.88
11. The assignments I turned in were graded and returned promptly.	14	1	0	0	0	1.07	0.25
12. A considerable amount of the material in CHEM-643 reviewed material I had in other courses.	1	1	3	9	1	3.53	0.96
13. I personally learned a lot researching my case study topic.	12	3	0	0	0	1.20	0.40
14. I found the work load in this class to be excessive.	1	4	2	8	0	3.13	1.02
15. My grades on the assignments reflected the skills and knowledge I have developed in this course.	1	6	3	4	1	2.87	1.09
16. I frequently talked about topics from this course with friends and other people not taking this course.	4	9	1	1	0	1.93	0.77
17. I feel confident in my ability to learn what I need to know to understand issues in intermediary metabolism.	7	6	2	0	0	1.67	0.70
18. I would prefer that the course had a PBL format for the entire course rather than just the last half.	2	2	2	7	2	3.33	1.25
19. This is the first course where I have had an oral examination given by the professor.	7	2	0	5	1	2.40	1.50
20. I would rather that part of the grade in CHEM-643 were based on mid-term and final examinations.	1	0	4	4	6	3.93	1.12
21. The instructions on writing a case study problem were insufficient guidance for me.	1	4	1	7	2	3.33	1.19
22. I would prefer if this class met in the late afternoon.	4	1	2	5	3	3.13	1.50
23. I frequently referred to the course web-site for information.	4	8	0	3	0	2.13	1.02
24. Constructing a concept map was a good group assignment.	2	4	2	5	2	3.07	1.29
25. I found the visitors to the class to be disruptive.	0	0	3	5	7	4.27	0.77
26. I would recommend this class to other students.	9	6	0	0	0	1.40	0.49
27. I would recommend Dr. White as a teacher to other students	12	3	0	0	0	1.20	0.40



### **Narrative Responses.**

**28. In a sentence or two, describe or characterize CHEM-643 to someone who might consider taking the course.**

- A. The course is very well rounded-you get to apply prior and new knowledge to interesting situations. No exams! But you learn a whole lot.
- B. Metabolism course with a focus on regulation and driving forces. Second half is case-based with no lecture.
- C. If you are a self-motivated student, you shall like.
- D. Some who enjoy metabolism or going into the health profession.
- E. CHEM643 is an interesting course because it is not just learning dry information from a textbook. Dr. White leads the class in an interactive manner so as to keep everyone interested and learning.
- F. The class is about the metabolism of fat as in your "working out" metabolism. As how all molecules are changed and knowing the possibilities change in our body/plants.
- G. Problems are presented as a series and you will work and discuss topics in group. There is very little lecture, thus you must be able to interact with others and be able to do outside research well.
- H. A class where you are given a general basis of information and you have to take it from there.
- I. An interactive course that gives most of the tools for understanding metabolism.
- J. Real life, applicable chemistry. Incorporates biochemistry, physiology, biology, nutrition, and chemistry.
- K. An interdisciplinary approach to intermediary metabolism. You get out as much as you put into it.
- L. The first half of the class is normal lectures while the second half [is PBL].
- M. Intermediary metabolism course where you can learn a great deal about various metabolism pathways.
- N. A course in practical applications of biochemistry.
- O. CHEM643 is a class where you will learn a lot of metabolism and learn a lot about how to learn about metabolism without worrying about memorizing pathways for exams. Dr. White splits the class up into lectures and case studies.

**29. Identify or describe some thing(s) that Professor White does particularly well.**

- A. He is very knowledgeable about intermediary metabolism and he conveys that very well. He is open to discussion on every single topic and asks questions that induce deeper thinking.
- B. Very knowledgeable and good at relating facts to a larger picture.
- C. He works very hard to identify ways to present things in an interesting way.
- D. During of office hours, he explains concepts really well.
- E. Dr. White was willing and helpful when I went to talk to him outside of class.
- F. Very good at pushing you to learn material yourself → strives for understanding.
- G. Asks questions that are intriguing and difficult enough that students must think logically to answer the question correctly. Never gives the answer right away but rather makes students find it on their own → better understanding of the material.
- H. Provide clues, without giving away too many answers to get the group on track.
- I. Asks appropriate questions and thereby engages students.
- J. Relates biochemical pathways to real processes. Uses current research to back up knowledge.
- K. Very good at putting metabolism in context of medical/nutritional/etc. significance, helpful outside of class.
- L. Getting assignments back on time. Making useful suggestions on how to improve work.
- M. He teaches well, Grades critically, Very helpful.
- N. He engages discussions among students as well as critical thinking.



- O. Emphasizes learning and understanding metabolism rather than useless memorization of specific details. Lecture well, emphasizes participation, and uses a variety of teaching methods to keep the course interesting.
- 30. Identify or describe some way(s) that Professor White could improve his teaching and/or your learning.**
- A. Perhaps at the beginning of the course, he could have a quiz (unrecorded) so that he/ the students have a good idea of what they knew or need to know.
- B. Exams in the course. No exams and busy semester = studying the material less of a priority for students.
- C. Ask more “reverse psychology” type questions to get a response. [I think this means play devil’s advocate.]
- D. No Response
- E. A little more guidance during case study problems.
- F. Very intimidating at times and when answers to questions are wrong in class discussion, incorporation of praise with the decline to answer not there.
- G. I thought that it may have been better to have 4 rather than 3 group. Five people in a group is a lot and 4 would have been better, because sometimes too many people want to talk at once. [Good point, I agree]
- H. Some of the case studies could be modified. See 1<sup>st</sup> page.
- I. Provide more focus and direction to the lectures. Initial overview more specific to topics to be covered.
- J. It may be helpful to discuss the homework a bit before it is due. Some of the skills or information needed was not available, and hard to obtain independently.
- K. Reduce the PBL component somewhat-I got more out of the lecture component.
- L. No Response
- M. I can’t think of one.
- N. It would be nice if we didn’t start the semester with a lot of review. [This student and a few others graduate students had studied metabolism at other schools and thus were ready to deal with the PBL part of the course. Unfortunately that would have been a tough transition for most of the seniors who had not had more than an introduction to glycolysis and the TCA cycle.]
- O. While it did not affect my learning, I think it may have been useful for others in my group if DR. White was more forward in pushing people to do work outside of class.
- 31. Reread the course syllabus and provide some thoughtful feedback. e.g. Did the syllabus adequately describe the course? Are there aspects of the syllabus that are unclear or misleading that should be revised? What is missing that should be included? Feel free to discuss this question with your classmates.**
- A. The course’s aim is to broaden student’s minds and get them to explore situations that apply to biochem. This was well achieved in the course through the various parts, e.g. the reviews of essential pathways, the PBL’s, and the case studies.
- B. The syllabus is good, however, it is easy to find or actually accidentally get to old/out dated syllabi for the course. [I need to check the links.]
- C. Yes
- D. No Response
- E. I thought the web-page gave a detailed and easy to follow explanation of the course. I bookmarked the web-page and referred to it at least one a week.
- F. Course syllabus very instructive and helpful on links on website. Schedule didn’t forewarn because of all cancelled classes-visitors-not teacher’s fault. [Hurricane Isabel closed the university and resulting rescheduling of West Coast meetings resulted in my missing two additional classes taught by visitors.]
- G. The syllabus was very helpful and thorough. The only problem I had was that example case studies from past years were not on the web to access. This would make it easier for everybody to review

form and content for this assignment. [Two copies of two different case studies by students from the past were available as examples as were the case studies used in the course. I am not sure posting student assignments on the web is the best way to deal with this. I don't want to have students copy the style and format when of one when there are many successful formats.]

- H. Yes. No.
- I. The syllabus is extremely thorough and does a good job of describing the course in all of its aspects.
- J. The syllabus was very accurate and a useful resource – especially with the links to information from the homework and case studies.
- K. Syllabus was generally helpful and representative of work. Case study could have used greater guidance early on.
- L. I think the course syllabus is clear.
- M. No Response
- N. Syllabus was very accurate.
- O. I read the syllabus before the first day of class and I felt like it gave me a good idea of what to expect. Reading the syllabus again at the end of the course has shown me how well it described the course. The only thing I would suggest changing about the syllabus would possibly be attaching a few good case studies from the past so they are accessible at all times.

**32. This semester was the third time that CHEM-643 has had a course web-site. To what extent did you find this useful, how frequently, and in what ways?**

- A. This web-site is very useful. I, however, did not use it too often as I could have. It is a very good idea.
- B. It was useful for quick reference, but no more useful than a handout. The links were quite helpful.
- C. I felt it very useful to check research and [such?].
- D. It was a great idea to have a course web-site because it saved for asking Dr. White questions and links are highly appreciated.
- E. Not only did I access it for homework, but I found the pathways helpful. Also I usually lose paper syllabus- so the web-page was better for me.
- F. Very helpful for resources and metabolic pathway sources → the website wasn't linked through chem. Course web-pages for direct link. [the missing link was made halfway through the course]
- G. It was very useful and I used the site almost every time I was working on material for the class. In particular, I liked the links in the problems sets and case studies. Also, the links to other sites with the case studies was useful. It was very easy to navigate through as well because it is well organized.
- H. Very helpful to what is coming up.
- I. I used it fairly often to clear up information that I missed in class re: assignment details.
- J. I used the course website more in the 1<sup>st</sup> half of the semester to work on the homework problems.
- K. Quite helpful, quite frequently. Good to refer to pathways in particular.
- L. I think it was very useful for reference such as the as the metabolic pathway and other links.
- M. Oh, I used it a lot – for case studies, problem sets. Also to go to PubMed and Web of Science sites. Links were very useful. When we misplaced our handouts, just go to the website and print without bothering Dr. White. It was extremely useful.
- N. I didn't use the website very much.
- O. The web site was great. I used it to print and check homeworks and case studies every week. Additionally, I frequently checked on the syllabus and more often the schedule to see what the next topic would be, or for the due dates for assignments.

**33. Reflect on the course and identify those aspects that you think could be improved. Please suggest ways for improvement.**

- A. I think the groups should have rotated. This way a combination of different people could put their minds together for a different result.

- B. Case studies were interesting and informative. Lecture part of the course did not have enough incentive to learn all the material- and exam(s) should probably be added.
- C. No Response
- D. Homework assignments.
- E. Move the concept map project earlier in the semester. Seemed like everyone in the group was too busy to meet outside of class.
- F. Class could be improved by more discussion of case studies/problems sets after we finished them because I/we still had unsolved learning issues or couldn't tie them in with the big picture.
- G. Would be better to have longer class periods-have class Tues/Thurs. Need better resources to look at during class-some better biochem textbooks and need more reliable computers for internet access.
- H. Mini-assignments to force students to start their case study sooner. Include pyrimidine/purine synthesis/degradation. [Purine and pyrimidine metabolism was a victim of hurricane Isabel and cancelled classes.]
- I. Give a written mid-term after the "lecture" portion is over. [I agree with this and probably will give a midterm the next time I teach the course.]
- J. More problem-based learning.
- K. In general, excellent course and excellent instructor. PBL component could benefit from a more equitable division of group members. Problem sets were somewhat excessive in length/time required for completion.
- L. I think the assignment which required a case study should be done earlier in the semester.
- M. Give problem sets as to write reports – not to just write answers. Other than that course was fine. [I think this comment refers to wanting assignments that require a report after doing a literature search rather than problem-solving assignments where structures and logical arguments are developed. See 34M student response as a continuation.]
- N. Some assignments were quite difficult and graded very harshly. It would be nice if assignment were not graded so hard.
- O. I truly enjoyed the course in a general sense. There are only a few small suggestions I have for improvement. First, I would have liked to have had a smaller, more intimate group. I found that some group members could sort of duck out of conversation and participation, which I did not like. I also feel that groups of 3 or 4 would not have been too small as to create an overbearing workload. Another aspect that this may have helped out with is the concept map assignment. I found that it was aggravating and almost impossible to get contributions from 5 people outside of class at a single meeting time, especially in the middle of a busy week late in the semester. I think we may not have had so much difficulty if the group were a person or two smaller. Our group ended up being frustrated with the assignment which created a general feeling of "let's just get this finished." It also may have been helpful to assign the map over a weekend as this could have likely been a better time for everyone to meet. I am not sure how feasible it could be to revamp the wireless laptops, but they could have been better. It is such a great resource in a discussion based, problem solving oriented class as this to be able to access journals on-line during class that the laptops are invaluable. However, their tendency to crash or freeze several times per class could become annoying to the point of putting off doing research to in between classes. However, it is worth emphasizing that these are minor points. I learned a lot in this class and would recommend keeping the same basic format.

**34. "Open mic" - Anything you want to add that you haven't said yet.**

- A. This course is quite ideal because although you need to dedicate a lot of time to it, it's not done under duress. It is therefore more enjoyable than most other courses.
- B. PBL in this course worked better than in CHEM-342, possibly because of greater intellectual "homogeneity" in the class.
- C. No Response
- D. No Response

- E. I had fun writing my case study problem but I can now appreciate how much time it takes to put everything together. Thank you Dr. White.
- F. The personal semester-long case study project was a great assignment. I learned so much in my own time and talked a lot about it outside of class to friends (in which they kept telling me to shut up ☺) and can completely relate it to real life and many other possibilities in intermediary metabolism.
- G. I really, really liked not having a final.
- H. I thought the course went very well as a whole.
- I. No Response
- J. I may get the lowest grade of any course I have taken in graduate school, but I feel I have learned (and will retain) the most. I truly enjoyed the format and the subject matter. (Thanks Dr. White!)
- K. One of the best classes I've had at UD to date, and one of the best (most helpful/knowledgeable) professors as well. Despite being hindered by somewhat lazy/unmotivated/dysfunctional group, I got an awful lot out of this class and would heartily recommend to other biochemistry majors.
- L. No Response
- M. I think if you can make the whole course PBL, that'll be good. We'll have lot of work to do but still we can learn so many things. Most important thing is we can develop our writing skills. Just doing problem sets won't help to develop scientific writing skill. I think this is very essential in science field. Other way is you can assign us to write reports like the first problem set. By that way people have to learn and think about material and also they'll develop writing skills. Just writing answers to problems sets won't help very much.
- N. It was a fun and informative class.
- O. [See this student's comments in response to previous question.]