

CHEM-643, Intermediary Metabolism, Fall 2011
Final Instructor Evaluation - Numerical Responses (24/25)
HAROLD B. WHITE – Instructor

Anonymous on-line Course evaluation conducted before final examination

QID 3425 - The instructor demonstrated thorough knowledge of the subject matter.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Total:		
Scale text						24 / 25		
Scale value	1	2	3	4	5	Mean:	4.92	Std. Dev: 0.28
Total	0	0	0	2	22			
Percent	0%	0%	0%	8.3%	91.7%	Median:	5	Mode: 5

QID 3426 - The instructor presented the materials in an interesting way.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Total:		
Scale text						23 / 25		
Scale value	1	2	3	4	5	Mean:	4.78	Std. Dev: 0.42
Total	0	0	0	5	18			
Percent	0%	0%	0%	21.7%	78.3%	Median:	5	Mode: 5

QID 3427 - The instructor encouraged class participation.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Total:		
Scale text						24 / 25		
Scale value	1	2	3	4	5	Mean:	4.83	Std. Dev: 0.38
Total	0	0	0	4	20			
Percent	0%	0%	0%	16.7%	83.3%	Median:	5	Mode: 5

QID 3430 - I would recommend this instructor because of his/her teaching to others considering taking this course.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Total:		
Scale text						24 / 25		
Scale value	1	2	3	4	5	Mean:	4.75	Std. Dev: 0.44
Total	0	0	0	6	18			
Percent	0%	0%	0%	25%	75%	Median:	5	Mode: 5

QID 4332 - The instructor's lectures were well organized.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Total:		
Scale text						24 / 25		
Scale value	1	2	3	4	5	Mean:	4.46	Std. Dev: 0.66
Total	0	0	2	9	13			
Percent	0%	0%	8.3%	37.5%	54.2%	Median:	5	Mode: 5

QID 4333 - The instructor was helpful if you sought help outside of class. (Don't respond if you didn't.)

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Total:		
Scale text						23 / 25		
Scale value	1	2	3	4	5	Mean:	4.83	Std. Dev: 0.39
Total	0	0	0	4	19			
Percent	0%	0%	0%	17.4%	82.6%	Median:	5	Mode: 5

QID 4334 - Overall, the instructor was effective in facilitating your learning of the material in this course.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree		
Scale value	1	2	3	4	5	Total:	24 / 25
Total	0	0	0	6	18	Mean:	4.75 Std. Dev: 0.44
Percent	0%	0%	0%	25%	75%	Median:	5 Mode: 5

QID 4648 - I would recommend Dr. White as a teacher to other students

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree		
Scale value	1	2	3	4	5	Total:	23 / 25
Total	0	0	0	5	18	Mean:	4.78 Std. Dev: 0.42
Percent	0%	0%	0%	21.7%	78.3%	Median:	5 Mode: 5

CHEM-643, Intermediary Metabolism, Fall 2011
Final Instructor Evaluation - Narrative Responses
HAROLD B. WHITE – Instructor

Question ID: 3435 - Comment on the instructor.

Responses (19 of 25)

- Dr. White has an amazing ability to engage students in a way that leaves them with a strong conceptual understanding of even the most intricate and confusing topics. Metabolism is just a series of reactions at the surface level, but at a deeper look it is repeating patterns and motifs, highly conserved, logical, and filled with complex interactions and equilibria. These things, while being the most difficult to convey, are the ones I feel I understand best by his lectured explanations but most importantly by his problem sets and PBL sessions which force you to confront and overcome the challenging concepts and misconceptions that exist in the subject. I have a strong understanding of what happens in metabolism, but why it is happening as well as an understanding of how metabolism interacts with other physiological systems. Not only is he a truly great professor, but by being infinitely caring and helpful he commands the respect of his class as a whole and the students as individuals. He is by far the best professor I have ever had and has had a strong impact on me as a student, a professional, and a person.
- Prof. White is a great professor. He is always willing to help a student through difficult material, and is very approachable.
- Great teacher, very knowledgeable on all subject matters.
- Dr. White is among the most dedicated lecturers I have ever had at UD. It is evident he puts a great deal of thought into every lesson, every lecture, every case study, and every assessment. He teaches in a way that makes science fun and interesting and does a great job of encouraging student participation. He is exceptionally interested that his students learn metabolism.
- Dr. White is incredibly involved in the course. His teaching style is a little different, but it is incredibly effective
- Dr. White's passion for teaching and learning is infectious. It makes class extremely interesting and I found myself waking up each morning excited to go to class.

- the instructor knew his material very well and was always encouraging our participation in attending biochemistry seminars when the topics were related to class topics. He's always very helpful if you drop in with questions and helps you understand the material.
- Dr. White is very creative in his presentation of the material and he is able to masterfully create problems that help one to identify gaps in knowledge.
- Dr. White is by far the most friendly, approachable and knowledgeable professor I have met in my 4 years at the University. I have been enlightened by his charismatic attitude and abstract approach to in class teaching. He allows for the students to teach themselves while providing a guiding influence in each lecture leading the students towards the final goal. The final goal is life long learning and he has facilitated this mentality into my attitude.
- Dr. White has a deep commitment to ensuring that students leave his class with sound knowledge of facts and an ability to identify trends. He also places a great deal of emphasis on self-directed inquiry, and his classes have helped me mature into a better student and researcher.
- Dr. White encouraged students to work together, but also encouraged us to be independent and research topics to learn on our own. Very helpful professor, very approachable and always willing to help.
- Prof. White is one of the best professors I have had at UD. He wants us to understand the material and apply it into distinct situations. He emphasizes learning rather than memorization
- Prof. Harold White may be one of the best professors at UD. Certainly the best one I have had in my college career. He is very helpful in facilitating the whole class's understanding of the subject matter. He focuses on understanding the material rather than memorizing random facts and his PBL teaching method and concern for each student demonstrates this. Through the search for understanding complex concepts each student is inspired to think at a higher level...something that rarely happens even at many college classes. His lectures are very entertaining; encouraging class participation all the time and using the craziest analogies for certain chemical processes that they just work. Prof. White is the best. Keep up the good work.
- Professor White is an amazing teacher and truly understands the learning process and how to facilitate this process. He does not emphasize memorization but emphasizes pattern recognition. Because of this, I have learned not only how to approach this class but life (other classes, etc...). Great professor!
- He thoroughly demonstrates knowledge of the subject matter. He is an advocate for passing down essential information to students so that they have the necessary skills to learn and understand which will assist in their success.
- I really enjoyed Dr. White's PBL approach. His teaching alone has been the most enjoyable experience in the biochemistry program. The creative skills reinforced by problem solving and the way in which he pushes students to excel is unmatched within this university. Please encourage others to follow Dr. White's example.
- Well prepared with a strong knowledge of the material.
- I am extremely grateful to have Dr. White as a professor. The way he challenges students' minds is incredible and I feel I have truly learned an enormous amount as his student.
- He is very knowledgeable, really knows how to guide students through.

Question ID: 3608 Identify or describe some thing(s) that Professor White does particularly well.

Responses (22 of 25)

- Engages students to help them understand the true nature and importance of something. There is nothing surface level about anything we learn. It is about understanding why things happen, how they happen, and its importance in 'the greater scheme of things'.
- Prof. White does a good job of making biochemical processes easy to learn and follow. His teaching of patterns over raw memorization is extremely helpful.
- He is good at inspiring people to find an answer instead of just giving them one, and he helps people to understand material instead of just memorizing it.
- He lets student solve problems themselves without giving away answers. He has mastered the ability to balance not giving answers to facilitate PBL with giving some guidance when necessary to facilitate learning. Dr. White is great at presenting science in a manner that makes it exciting. Loved opening each class(or many classes) with a mystery molecule and a short story to go along with it.
- Very good at encouraging independent thought and analysis of topics.
- He is always extremely helpful when asked a question, and rather than just answering it, he makes sure that you understand it fully.
- Dr White rarely uses powerpoint presentations, which work to his advantage and teaching style. This course covers a lot of material and by lecturing and using the blackboard, you have more time to absorb the material and try to understand it. His ultimate goal is understanding not memorization and the problem based learning groups re-enforce his goal provoking thinking and discussion.
- Dr. White is very friendly and approachable. He is almost always glad to pause his task @ hand and take a moment for the student.
- His high expectation for students certainly sets the tone for the course and drives students to strive to improve.
- Provides useful information but never divulges the answer so that the student must search and search for the answer until finally it becomes evident, this results in students working harder before asking questions.
- He is very helpful outside of class and makes sure that everyone is understanding topics, not just the smartest people in the group.
- The problem-based learning components of Dr. White's courses are very well integrated with the subject matter. Dr. White is excellent at initiating small group discussion, and asks questions that require comprehensive understanding of material.
- He really knows what he lectures on very well. He makes the class intriguing and interesting.
- Encourage participation and make students think outside common boundaries, he has shown us how to integrate biochemistry into multiple fields and see their prominence in our lives
- Facilitating the whole class's understanding of the subject matter Very helpful. Cares about each student. PBL teaching strategy particularly helpful in learning, but Prof. White also helps to direct where the discussion goes.
- Professor White has set up this class excellently. When professors just lecture on information, it is so boring and I submit nothing to storage, it all goes to short term memory and is quickly replaced by other information. However, by setting this class as a PBL, I am engaged in problem solving case studies and have to gather and understand

information about the same topics. This has been an amazing way to learn because I am actually able to commit the knowledge to storage.

- facilitate a deeper understanding of material through PBL based methods.
- Dr. White is a supportive and creative mentor. I have enjoyed learning the course material and beyond by his approach toward teaching. Dr. White utilized the PBL approach with engages students' minds more so than traditional lecture classes may. His course encourages students to seek knowledge and information beyond the boundaries of the textbook, syllabus, or department. His style and approach toward both of his courses that i have had the honor to attend have made me a better student, a more curious person, and a well rounded biochemist. I believe that he emphasizes scientific literature in a unique and entertaining way. Plus he's REEEEEEEEEEEEEAAAAAALLLLLYY intelligent. More importantly from a students perspective, Dr. White is very personable. I have been able to relate with him and aspire to the level of excellence that he sets as a standard. He is an exemplary professor, friend, scientist, mentor, and student. He is always learning and pushing his "art" forward. I wish he would give more homework.
- Good at explaining patterns in metabolism to better help the students understand more pathways without simply memorization.
- -Asks questions that stimulate thinking and further question progression. -presenting material and fun stories/facts -assigning homework that helps better understand material in the class
- It is hard to teach effectively without lecturing, and I think Dr. White walks this line well. I particularly like the emphasis on following patterns rather than memorizing isolated reaction sequences. The farther I got into the course, the more interrelated the metabolic pathways seemed. I wish that this had been emphasized in earlier classes. For example, in other classes it has always just been "this reaction uses biotin" rather than "biotin has this type of effect as seen in this reaction example". If I had payed more attention to the chemistry of the reaction I might have seen this pattern myself, but I did not, and it was not taught in that manner.
- make every student involved and participated

Question ID: 3609 - Identify or describe some way(s) that Professor White could improve his teaching (and your learning).

Responses (19 of 25)

- There is virtually nothing to say. One of the most amazing things about Dr. White is that he continually strives to make his teaching better. Everything that has been less than ideal in this specific course (some students have mentioned the timing of the final project) Dr. White has already discussed with class. Any bad test questions have already been gone over and modified. There is no better way this course could be taught.
- I really do not have any critiques in this area. I am not a big fan of problem based learning, sometimes it gets annoying. But if any other teacher than Professor White were doing PBL than I would most likely hate it.
- Hard to think of anything, but if there is anything to criticize it might be that sometimes he want fast during lectures. Its good that chalk is used instead of powerpoint because it slowed him down, but sometimes I felt a step behind what he was talking about when he was drawing pathways on the board. This also could have been because I wasn't always prepared enough for class and didn't know every structure.

- My only recommendation is that the problem sets should be worth more towards the final grade. I spent at least 15 hours per problem set, and feel as though they really represent strong thinking and learning. They help tremendously on the exams, but I would still like them to be worth a little more. Also, getting the final project assigned earlier and talking about it earlier would be helpful. I felt rushed and would have liked more time.
- Dr. White could try not to squeeze so much in the last 2-3 minutes so that there can be more time for questions before it is time to go.
- Despite planning on Dr. White's part, some of the lectures that we were spent in group discussion were less than productive. perhaps a more structured homework set (as opposed to tables / COSY etc.
- A little more lecture time and a little less group learning only because I felt as if in some cases my group would get off topic and would lose a class so when we came in the next class we would be a little behind and have to catch up to what the next lesson was. Perhaps if a summary for the goal of each class was provided at the end of each class it would make for a more sound class each day.
- I think that he uses too much group work. It is good for going over case studies and other difficult projects, but it is frustrating to be a senior and be reliant upon a group of peers for so much.
- Dr. White's class would have been more valuable if there was more written work to complete. Problem sets could have been slightly more challenging. Working through problems forces one to think about material, in ways that reading to comprehend does not. While I understand that a desire to learn should be innate, many courses are competing for our time, and those courses which assign the most work are the subjects on which students spend the most time.
- Possibly more handouts.
- I believe that giving more time (as in starting the meetings) for the final project earlier would be ideal. We all had very little time to work on it during Thanksgiving and many of us had to sleep in Brown the night before the due date. Some didn't get to sleep at all
- Professor White could provide Powerpoint slides or class notes on certain topics to help students with reviewing specific topics. Taking notes during his class while trying to participate and understand the material is difficult at times. Professor White could assign more group projects. I found the final project to be especially helpful in learning about the specifics of enzyme composition and amino acid metabolism in other organisms.
- The only recommendation I would suggest is providing a class period (or two) to work on the group project towards the beginning of the semester. If the groups are given mandatory time to work on the group project earlier, groups would not wait until the last minute to understand and work on the project.
- The final project should be given the week before Thanksgiving break, so that the group can meet and do some work and then individual work can be pursued during break.
- Dr. White should take some time off to meet scientists and catch up on some of the reading he would probably like to do. He may find some new ideas to build this course and his intellectual offspring with. He sets the bar for excellence and I only suggest he move it forward for both himself and others.
- Provide answer keys to problem sets and tests. I understand that posting this online would allow future students enrolled in this class an unfair advantage if the problem sets remained the same, so instead keep a hard copy of the answer key in your office so only students can examine it during office hours.
- I am completely satisfied with this class and Dr. White's teaching.
- One thing I think would be really helpful is if everyone in the class got one of the Sigma metabolic pathway maps. It really helps to show how interconnected everything is, and

after I had one, it was very useful for the problem sets. Maybe it could be worked out somehow that it would be bought through the class, or at least suggested at the beginning of the semester.

- None

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Total = Responded / Enrolled

QID 4329 - The course was well organized.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree			
Scale value	1	2	3	4	5	Total:		
Total	0	0	1	4	19	Mean: 4.75	Std. Dev:	0.53
Percent	0%	0%	4.2%	16.7%	79.2%	Median: 5	Mode:	5

QID 4330 - The course textbook was very useful.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree			
Scale value	1	2	3	4	5	Total:		
Total	0	0	2	7	15	Mean: 4.54	Std. Dev:	0.66
Percent	0%	0%	8.3%	29.2%	62.5%	Median: 5	Mode:	5

QID 4331 - The course examinations emphasized understanding of the material.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree			
Scale value	1	2	3	4	5	Total:		
Total	0	0	0	2	22	Mean: 4.92	Std. Dev:	0.28
Percent	0%	0%	0%	8.3%	91.7%	Median: 5	Mode:	5

QID 3419 - The course emphasized understanding of the material rather than memorization.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree			
Scale value	1	2	3	4	5	Total:		
Total	0	0	0	3	21	Mean: 4.88	Std. Dev:	0.34
Percent	0%	0%	0%	12.5%	87.5%	Median: 5	Mode:	5

QID 4650 - I am a(n) _____.

Scale text	Undergraduate	Graduate Student	
Scale value	A	B	
Total	22	2	Total 24 / 25
Percent	91.7%	8.3%	

QID 4651 - On average, I spent X hours a week outside of class on work related to CHEM-643.

Scale text	<3 hr/wk	3-6 hr/wk	6-9 hr/wk	9-12 hr/wk	>12 hr/wk	Total
Scale value	A	B	C	D	E	
Total	1	7	7	5	4	
Percent	4.2%	29.2%	29.2%	20.8%	16.7%	24 / 25

QID 4629 - I found working on the homework problems in the first half of the course to be a valuable learning experience.

Scale text	Strongly Agree	Agree	No opinion/Undecided	Disagree	Strongly disagree	Total
Scale value	A	B	C	D	E	
Total	17	5	2	0	0	
Percent	70.8%	20.8%	8.3%	0%	0%	24 / 25

QID 4631 - I learned more working on the homework problems than I did working on the case studies.

Scale text	Strongly agree	Agree	No Opinion/Undecided	Disagree	Strongly disagree	Total
Scale value	A	B	C	D	E	
Total	9	6	5	3	1	
Percent	37.5%	25%	20.8%	12.5%	4.2%	24 / 25

QID 4632 - Based on things I learned this semester, I would really like to learn more about intermediary metabolism.

Scale text	Strongly agree	Agree	No opinion/Undecided	Disagree	Strongly disagree	Total
Scale value	A	B	C	D	E	
Total	16	4	3	1	0	
Percent	66.7%	16.7%	12.5%	4.2%	0%	24 / 25

QID 3583 - The assignments I turned in were graded and returned promptly.

Scale text	Never	Rarely	Sometimes	Frequently	Always	Total:		
Scale value	1	2	3	4	5			
Total	0	0	0	0	24	Mean:	5	Std. Dev: 0.00
Percent	0%	0%	0%	0%	100%	Median:	5	Mode: 5

QID 4634 - A considerable amount of the material in CHEM-643 reviewed material I had in other courses.

Scale text	Strongly agree	Agree	No opinion/Undecided	Disagree	Strongly disagree	
Scale value	A	B	C	D	E	Total
Total	6	7	5	5	1	
Percent	25%	29.2%	20.8%	20.8%	4.2%	24 / 25

QID 4635 - I personally learned a lot researching my term case study assignment.

Scale text	Strongly agree	Agree	No opinion/Undecided	Disagree	Strongly Disagree	
Scale value	A	B	C	D	E	Total
Total	9	10	3	1	0	
Percent	39.1%	43.5%	13%	4.3%	0%	23 / 25

QID 4636 - I found the work load in this class to be excessive.

Scale text	Strongly Agree	Agree	No opinion/Undecided	Disagree	Strongly disagree	
Scale value	A	B	C	D	E	Total
Total	2	3	7	10	2	
Percent	8.3%	12.5%	29.2%	41.7%	8.3%	24 / 25

QID 4637 - My grades on the assignments reflected the skills and knowledge I have developed in this course.

Scale text	Strongly agree	Agree	No opinion/Undecided	Disagree	Strongly disagree	
Scale value	A	B	C	D	E	Total
Total	7	10	5	2	0	
Percent	29.2%	41.7%	20.8%	8.3%	0%	24 / 25

QID 4638 - I frequently talked about topics from this course with friends and other people not taking this course.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	
Scale value	1	2	3	4	5	Total:
Total	0	3	2	11	8	24 / 25
Percent	0%	12.5%	8.3%	45.8%	33.3%	Mean: 4 Std. Dev: 0.98
						Median: 4 Mode: 4

QID 4639 - I feel confident in my ability to learn what I need to know to understand issues in intermediary metabolism.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	
Scale value	1	2	3	4	5	Total:
Total	0	0	0	12	12	24 / 25
Percent	0%	0%	0%	50%	50%	Mean: 4.5 Std. Dev: 0.51
						Median: 4.5 Mode: 4, 5

QID 4642 - Other members of my group did their fair share.

Scale text	Hardly Ever	Occasionally	Sometimes	Frequently	Almost Always				
Scale value	1	2	3	4	5	Total:	24 / 25		
Total	0	1	5	6	12	Mean:	4.21	Std. Dev:	0.93
Percent	0%	4.2%	20.8%	25%	50%	Median:	4.5	Mode:	5

QID 4644 - I would prefer if this class met in the late afternoon.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree				
Scale value	1	2	3	4	5	Total:	24 / 25		
Total	3	7	5	6	3	Mean:	2.96	Std. Dev:	1.27
Percent	12.5%	29.2%	20.8%	25%	12.5%	Median:	3	Mode:	2

QID 3599 - I found the course web-site to be a useful resource.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree				
Scale value	1	2	3	4	5	Total:	24 / 25		
Total	0	0	1	6	17	Mean:	4.67	Std. Dev:	0.56
Percent	0%	0%	4.2%	25%	70.8%	Median:	5	Mode:	5

QID 4645 - I liked the structure of the quiz with an individual response followed by group response.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree				
Scale value	1	2	3	4	5	Total:	24 / 25		
Total	0	2	1	7	14	Mean:	4.38	Std. Dev:	0.92
Percent	0%	8.3%	4.2%	29.2%	58.3%	Median:	5	Mode:	5

QID 4647 - I would recommend this class to other students.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree				
Scale value	1	2	3	4	5	Total:	24 / 25		
Total	0	0	2	8	14	Mean:	4.5	Std. Dev:	0.66
Percent	0%	0%	8.3%	33.3%	58.3%	Median:	5	Mode:	5

QID 13330 - I found working on case studies to be a valuable learning experience.

Scale text	Hardly Ever	Occasionally	Sometimes	Frequently	Almost Always				
Scale value	1	2	3	4	5	Total:	23 / 25		
Total	0	1	7	7	8	Mean:	3.96	Std. Dev:	0.93
Percent	0%	4.3%	30.4%	30.4%	34.8%	Median:	4	Mode:	5

QID 13331 - Instead of case studies and group work, Dr. White should have lectured for the whole semester.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree		
Scale value	1	2	3	4	5	Total:	24 / 25
Total	8	9	4	3	0	Mean:	2.08 Std. Dev: 1.02
Percent	33.3%	37.5%	16.7%	12.5%	0%	Median:	2 Mode: 2

QID 13332 - I would prefer that the course had a PBL format for the entire course rather than interspersed with lecture.

Scale text	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree		
Scale value	1	2	3	4	5	Total:	24 / 25
Total	7	12	3	0	2	Mean:	2.08 Std. Dev: 1.10
Percent	29.2%	50%	12.5%	0%	8.3%	Median:	2 Mode: 2

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Final Course Evaluation - Narrative Responses
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Question ID: 3436 - Comment on the course.

Responses (17 of 25)

- Great course. PBL and groupwork was amazing supplement to lecture. The beginning of the course focused on big picture concepts and patters, the middle on pathways and characteristics of metabolism, the second half on applying the general rules and pathways to complex problems and situations to fortify our understanding of things. One of my favorite courses. By the end, I feel that my group and I were doing truly impressive work for undergraduates, understanding it, and legitimately enjoying it. Wait! I thought of something. My group and I were talking, and we got to know each other really well over the course of the final project, and had a great time in our distracted/unfocused time at 3am. I think that the groupwork in the course would have gone even better had we had this formative experience at the beginning. Until the last week of class, I did not particularly know my groupmates that well. It would take some rescheduling, but perhaps adding some sort of group assignment in the beginning of the course would accomplish a similar goal. A simple solution would be to make the first problem set a mandatory group assignment? It would serve a similar function to the group activity in 342. Just a thought.
- Difficult course but I learned a lot.
- Excellent course. Metabolism is a fascinating subject and it was presented in a way that touched on every area of biochemistry, from genetics to molecular biology to bioinformatics. I particularly liked that about the course - sort of a capstone experience. I also like how metabolism relates to our every day life and that it is still a tremendously important area of research.
- I liked how the course was split into lecture and PBL groups. The lecture portion aided in thorough knowledge of material, while the PBL portion helped us understand Metabolism's applications.

- This course has a ton of information associated with it, but it is also very interesting. The content of the course gives a great representation of intermediary metabolism as a whole, and gives us a solid foundation for the rest of the metabolism world.
- This is a course that you have to be dedicated to. If you used to memorization, and not understanding, you'll be pushed a lot to put all that memorized knowledge together and understand how they interact.
- I heard about the difficulty of this class prior to taking it and came to find out it is not a difficult subject. It is just a subject that you have to put work into not the kind of course you can go to each class and study 2 days before the exam. It emphasizes not memorization but learning concrete facts each day so that you build on them constantly and by the end of the semester you have actually learned a great deal more than you initially thought.
- Chem643 was a great course! I am sad that we are at the end of the semester. I would have liked to cover slightly more material.
- I learned a lot from this course. I know a lot about metabolism now. I can deduce metabolism problems or scientific issues with knowledge of problem-solving taken from this class.
- An amazing experience, it allowed me to put into perspective how everything works in organisms. Of course there is more to investigate and learn but this course provided a great overview and insight into the world of biochemistry as an integrated, single entity
- Intermediary Metabolism is a very interesting course that really delves into the metabolic processes of the human body. It is a well-designed course and great as a sort of final high level Biochemistry course for most students. I really enjoyed the combination of lecture and group work on PBL assignments (that was lacking in Prof. White's Chem342 course). As always with Prof. White's courses, the focus is on truly understanding every aspect of a problem through research and the utilization of chemistry knowledge learned in every other course. I would strongly recommend this course for any inquisitive scientific mind out there as it really challenges one to think.
- On my favorite courses at UD. I would recommend anyone to take Professor White's classes (even if you have no background in Chemistry - he knows how to present material in an interesting way). I have always loved science and have always been amazed at the profound way science has evolved, but somewhere along the four years at UD, I forgot why I loved science (it became a little boring), until I came back into Professor White's class. He sparked that love and appreciation for science. I would like to thank Professor White for setting up his class as a PBL. Because of the groups, I have met and worked with some very talented students. I would even credit these groups for introducing me to my closest friends that I would never have grown to know and love without this class. I have not only learned how to approach learning because of Professor White, but I have also made friends that I will always cherish and go to. Thank you Professor White.
- The course was very instructive and useful as a tool to help students learn skills necessary to have as a scientist.
- Memorization is fleeting and overutilized. Problem solving and active knowledge is far better retained. This may sound like standard pro-PBL banter. This should sound like the truth. Many students may pass exams, and head to the book store to sell textbooks. This course promotes active learning. THERE IS NO GREATER LESSON.
- Requires several hours of outside work so problem sets and group project should be weighted more heavily.
- I enjoyed the course, and liked how it was structured. It functioned well as a capstone biochemistry class. The problem sets were hard and time consuming, but not

impossible. I appreciate that they were plentiful at the beginning of the semester and then stopped towards the end. As a senior my November/December has been incredibly busy with classes, applications, and constant time commitments. I liked having them primarily at the first half of the class when I had slightly more time.

- its a interesting course, inspiring people the way to think about biochemistry

QID 4649 - In a sentence or two, describe or characterize CHEM-643 to someone who might consider taking the course.

Responses (23 of 25)

- This course has a perfect balance of interactive lecture and group based problem solving to facilitate a deep and fluid understanding knowledge of the mechanisms and underlying principles of the biological process of metabolism.
- CHEM 643 is a good class to take if interested in metabolism. It helps to give a general knowledge of the material that one can use to understand new problems one may encounter in biochemistry.
- A very challenging course reviewing major points in metabolism. It helps you realize trends and tie together various pathways.
- An excellent upper level biochemistry course focusing on metabolism and emphasizing a format of problem-based learning and group work.
- This class is a great way to build upon information learned in 641 and 642 in a completely new environment. The wide range of assignment types helps to introduce and reinforce the information in a variety of ways.
- A well-organized, application-based approach to metabolism and analytical skills in the field of biochemistry.
- An extensive overview of intermediary metabolism is taught via lecture and PBL case studies and problem sets. It reviews the major pathways such as glycolysis and the krebs cycle, and encompasses everything together into a bigger picture.
- This course deals with metabolism and it's pathways and how they interconnect. It's a difficult class and substantial time needs to be put in.
- It's a mixture of lecture and PBL. You have to study and worked hard to do well.
- This course seeks to connect the dots of biochemistry, teaching the interdependence and careful regulation of life.
- CHEM-643 Is the type of course that you will learn lots of fun interesting facts but it really is the connecting of each prior subject to the next to create a whole. In your undergraduate career you will learn about the krebs cycle, fatty acid metabolism, amino acid synthesis, etc. but not until you take this course will you realize that everything that happens in our body on a daily basis is all connected in a dense web of metabolism pathways.
- The first half of the semester is a ton of work, and the group work can be frustrating if everyone does not contribute because you take quizzes as a group. But overall, you learn a lot and you never leave class feeling like you just listened to a lecture, you feel like you got a lot out of it.
- A good overview of intermediary metabolism, with emphasis on problem-based learning. Learn how to think about metabolism.
- CHEM643 is a group based course where you learn about intermediary metabolism and how your body breaks down and builds materials. You also learn how metabolism can effect your health.

- An integrated overview of the different pathways an organism needs to sustain life. Challenging and demanding, but highly rewarding course
- Students are asked to focus on understanding the metabolic processes occurring inside the human body through pattern recognition and memorization of more simple chemical reactions.
- Chem 643 will examine metabolism in an exciting and engaging way. Students will learn to recognize patterns and build upon the principles of Chemistry they have learned over the past three years as a Biochemistry major.
- A great experience if interests lie in the biological or chemical sciences, specifically with metabolism
- A
- The class is an overview of the reactions of metabolism and how pathways relate to each other in terms of equilibrium.
- A fun way of learning our bodies' biosynthetic processes by asking questions in groups and feeding off of each student's strengths and weaknesses.
- CHEM-643 is a biochemistry capstone course for those interested in getting both the big picture of metabolism as well as the pathway details. Using pattern recognition and critical thinking, the class emphasizes understanding and problem solving rather than memorization. I would highly recommend the course to motivated students willing to work hard for a greater understanding of the internal machine which keeps our body running.
- learn how to address problems not memorizing materials

Question ID: - 3610 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.

Responses (22 of 25)

- Not helpful... but no changes. It has been revised so many times at this point it does just about everything it needs to.
- The course syllabus seemed to describe the course well.
- There was nothing wrong with the syllabus.
- I used the syllabus and the course website and schedule regularly throughout the semester. Everything is excellent. There are links for just about everything, it is visually simple and very well-organized and easy to follow. The syllabus described the course very accurately and clearly laid out content and expectations.
- The syllabus was a great source of information for the course. the provided information from previous years was helpful in tackling the assignments and studying for exams
- Overall, the syllabus seemed accurate to the course. I noticed that you mentioned pop-quizzes were an option in the syllabus, while none were given in class. I think this would have been a good thing to stress comprehension of the articles.
- Well, first off under the homework assignment section the date is wrong. They were always due on Fridays and not Wednesdays. Other than that there really are no changes I would make. I find the syllabus to be a good representation of the course and what you expect from each of us.

- The homework always took more than 12 hrs to complete and were frustrating at times.
- Syllabus looks good. used the links on there many times myself.
- The syllabus gave adequate description of the course and all that it entails
- The syllabus and CHEM-342 completely prepared me for this course. I found that the syllabus was my most useful source of information because it gave me resources to look at for extra information. All of the case studies. The only thing that I wish would have been on the site but I know Dr.White would never divulge is the answers to past exams and quizzes.
- The syllabus is extremely accurate and the links and pages were very helpful. I wish the midterm we sooner, so that there was less on it and so that there was more new material on the final.
- The course syllabus is clear.
- The syllabus did adequately describe the course. No missing material. It was very informative.
- I think that the syllabus covers all the bases. Maybe re-evaluate the amount of points the final project is worth
- I thought the syllabus was well done and covered all aspects of the course. It outlined each aspect of the grading scheme and in doing so the course schedule and structure as well.
- The syllabus described the course and provided a step by step insight on what to expect during the semester.
- The syllabus accurately described the course nothing is misleading.
- B
- Everything was covered that was stated.
- Yes. No, the syllabus was very clear and I do not think any revisions need to be made aside from inactive links.
- I think it was quite clear.

Question ID: 13333 - In groups you have worked through three extended case study problems, 1. Life without oxygen, 2. Are you what your eat?, and 3. Plants vs. Animals in the Dining Hall. Please rank these three in terms of their overall value to your learning. And state the virtues of the one you rank number one.

Responses (22 of 25)

- Plants v animals in the Dhall Life without oxygen You are what you eat Plants v animals in the dining hall was great because it really put all of the specific metabolic pathways we were learning in the context of how they function and why they are useful in terms of larger biological systems. Figuring out the evolution of Essential vs non essential amino acids based on biomes and the evolution of ecological systems is a pretty amazing connection to make in one problem. And that was one of the many things involved in this problem. Assignments that cause you to make jumps between orders of magnitude of knowledge and topic is how you really develop a thorough, working understanding of the interplay and role of various processes. By doing enough of these type things, you really almost begin to put together a COMPLETE knowledge of how the physical world works. (<physics<chemistry<biochemistry<<<physiology<Biology<ecology)
- I found Are you What you eat to be the most valuable for the topic of photosynthesis was one I had the least amount of previous knowledge on. The Plants v Animals was rated

number two for I found this case to be the most interesting and useful for real life applications. The last rated study is that of life without oxygen. This article seemed to be the least interesting of the three and I seem to forget the details of this one the most.

- 3, 2, 1. I liked 3 because I am interested in the different nutritional aspects of different organisms. I just thought that 2 was slightly more interesting than 1.
- 1. Life Without Oxygen 2. Plant vs Animals 3. Are you what you eat? There was nothing I didn't like about are you what you eat, but I really liked life without oxygen and plants v animals. Life without oxygen provided an important review of material we already should have been familiar with, but presented it in a way we had never seen before which was enlightening.
- Plants vs. Animals- This one was particularly interesting because it connected a lot of misconceptions people have about vegetarianism with scientific facts 2. Life without Oxygen- I liked this case study because it was an interesting way to look at how our body adjusts to different conditions. I liked the application of low oxygen environments and exercise. 3. Are you what you eat-
- I got the most out of case study 3: Plants vs. animals in the dining hall. In my opinion, it was the most relatable case study, and therefore easiest to write/study about. In addition it was much more interesting to discuss in class. I would then rate Life without oxygen (1) as 2nd, and Are you what you eat (2) as 3rd.
- I found the plants vs. animals in the dining hall to be the most valuable. It was the most interesting in the fact that it applied to our every day life. There is a constant discussion of vegan vs. vegetarian vs. eating meat. I never really knew the differences and this made us research it. I found it very interesting. I liked are you what you eat the second most because it was also a pretty interesting question. Photosynthesis is a hard topic, and this made it more interesting. I did not like life without oxygen. Maybe it was because it was early in the semester, but it still was not my favorite. I did not find it as interesting and useful as the other two.
- PLants versus Animals allowed me to interact more with the group than the other two. 2. Are you what you eat. 3. Life without oxygen.
- 3, 2, 1 I think I learned the most and understood 3 the best of all the topics.
- Life without oxygen - #1. most interesting and challenging data.
 - Plants v Animals --> In my opinion, this case study provided the most relevant connection between what we had been learning in class (pathways inside the body, which you can not see/monitor directly) to everyday life. Connecting eating and nutrition to what actually happens when you eat heightened my interest and brought together all that was previously learned. 2- Are you what you eat 3- Life without oxygen
- Plants vs. Animals in the Dining Hall 2. Life without oxygen 3. Are you what you eat? I chose Plants vs. Animals as my overall greatest learning case study. This is because before this case study I thought you can't just eat non-animal products you can't get all of the nutrients to survive but found out that both diets can be harmful unless they are sufficiently managed by taking correct supplements and by watching what you eat. I also learned that eating some fruits and vegetables provide more of certain essential nutrients than animal products every could.
- I really didn't care one way or the other for any of them. They were all interesting in their own way, but I knew the most about the plants and animals paper coming into the class, which made it easier to follow.
- Life without oxygen. 2. Are you what you eat 3. Plants vs. Animals 1. This case study was the most valuable because it featured significant amount of seminal literature in

biochemistry. I would have liked to see incorporation of more primary literature into the other case studies.

- 1)Plants vs. Animals in the Dining Hall 2)Are you what you eat? 3)Life without oxygen I never really knew how being vegetarian affected your body or if it was good or bad for you. This case study encouraged me to research this matter and I learned a lot of useful information.
- Plants vs. Animals 2. Are you what you eat? 1. Life without Oxygen Although each case study was helpful in understanding the different topics, Life without Oxygen really helped the most in learning about metabolic switching and the changes in aerobic and anaerobic respiration in yeast. This case study also focused on analyzing figures and understanding a new graph I was not familiar with. Once the figures were understood, the pattern had to be recognized and connected back to the the biochemical reaction in order to determine where the inhibition occurred.
- Plants vs. Animals 2.Life Without Oxygen 3. Are you what you at The case study " Plants vs. Animals in the Dining Hall" was superb in gathering all of the aspects of this course. I found this problem set highlight aspects of nutrition, essential nutrients, and the incorporation of amino acids in the body.
- Plants vs Animals in the dining hall, 2. Life without oxygen, 3. Are you what you eat. I picked this order because I feel like I was able to comprehend and understand the trends that existed/ the ways experiments and conclusions were made the most. This may be biased to what interests me personally though.
- B
 - Life without O₂- graphs helped understanding 2)Are you what you eat?- caused critical thinking 3)Plants V. Animals- slightly confusing questions
- 3,2,1. I found Plants vs. Animals in the Dining hall to be most interesting and fun to learn because it truly does apply to everyone today and focuses on a popular topic in present society.
- 2. 1. I ranked plants vs animals first because I remember the most from it. However, it was the most recent and we spent the most time on it. All three were good though.

Question ID: 13334 - The final group project was intended to be a capstone biochemistry experience that integrated metabolism with other biochemistry courses you have had. Was it successful in this regard? Explain why or why not.

Responses (21 of 25)

- I feel that it was. In all honesty, the final project did not involve metabolism too intimately. The processes we were looking at were metabolic pathways, however the actual work did not really involve learning anything new about metabolism. However, it was still a real capstone course because the knowledge of metabolism needed for the project I did not have at the beginning. It is actually a testament that were so comfortable with the metabolic processes involved in the final project that it did not require any new metabolic knowledge. It was great to be able to incorporate knowledge of pathways, genetics, protein synthesis, and other subtopics to answer a single hypothesis. Also, its great to have first hand experience in the new and growing field of bioinformatics. Even a student does not work personally in bioinformatics, technology based science is going to be important in all fields and is something we should be familiar with.
- I feel that the final project incorporated information from 642 and 641. the knowledge of genomes and proteins from 641 and 642 were applied to the bio-synthesis of amino acids from 643.

- Some what yes, but I feel that with the topic of the project it would be easy to stray from these ideals.
- It was a capstone experience and the analysis of data required insight from various biology and chemistry courses we have taken. My only complaint was that the bioinformatics was tedious and after becoming oriented with the methods it felt like a good deal of busy work, but these were important skills to pick up and bioinformatics is becoming increasingly important to biochemistry.
- NO. I agree with 99% of the things that Dr. White does as a teacher, but this group project is part of the other 1%. This group project was mostly busy work to answer one pretty simple question. The compiling of information took the majority of the time, which is not what I feel Dr. White intended. When the project was presented to us, it was supposed to be a 4-8 pg paper. When it was finished, just the writing was almost 20.
- Overall, yes it was. However, this project was very challenging and non-directed. I feel as though many groups felt stressed for time because they were not worried about the project until in-class discussion began. I think if in-class discussion of the project was broken up throughout the semester (starting soon after the problem was assigned), it may encourage students to do more work ahead of time.
- Yes I definitely think it was. I found this very valuable in learning how to analyze genomes and do BLAST searches. It took an interesting approach to an interesting question and forced us to do research that most of us will encounter in future times in our lives.
- The final project didn't really integrate metabolism with other biochemistry courses that I've had. It was just some excel analysis and analyzing your gene against other genomes using specific websites. This wasn't taught to me in other classes.
- This final project was an interesting assignment, but it was more sequence alignment than discussion of protein function for our group. I personally found the hemoglobinopathy assignment to be more creatively open ended and this promoted personal exploration
- extremely successful, it is by far the most labor intensive project I have been involved in this year. It takes many of my prior courses knowledge and use of computer programs in order to deduce problems, conserved sequences and understanding of subjects that have no explanation to this current date.
- I thought that the project was a lot of busy work and data collection with very little understanding, which was unusual for this class. I really didnt see the point of the project, and i think that a different project should be considered. Also, the programs and sites needed to do the project were completely foreign for most people, so a lot of time was wasted just trying to figure out the programs.
- The final project was successful as a capstone in that it required us to be creative. The project mimicked a small research project: identifying a research question, gathering data, and figuring out the best way to analyze and present data should be second nature to competent scientists.
- The genome project, in my opinion, doesn't really integrate metabolism. It was hard for the students to do this project because its genetics based and we needed to learn how to navigate genome sites (which was hard to do). I would of rather have done a project that dealt with metabolism. Also, I think we should of had more time to work on it. Maybe start the project more toward the beginning of the semester with some class time geared toward research for it.
- I don't think that it really integrated metabolism all that well, it was more of an overall enzymology study. It did not emphasize integration, rather, it examined and compared enzymes all together

- The final group project was very open-ended and left up to the group to decide on how to approach the problem. Not many of the other biochemistry courses were essential in completing this project. Knowing some information on enzymes was helpful although definitely not required. The most useful class for this project was CHEM645 Protein Structure and Function. Projects in this class utilized the same programs and databases to complete homology modeling of unstructured proteins. However, most students would not have taken this class as of yet and even then having knowledge and familiarity with the programs was more of a time-saving device than actually essential to solving the problem.
- The project was a great way to integrate several concepts including bioinformatics. It was very successful.
- Yes, if treated like a proper novel research experience, this project really draws from many different concepts that are taught throughout the undergraduate career. The fact that total freedom is given to figure out how to analyze and draw conclusions is really how the world of science works.
- B
- Yes it was an extensive project, but it did not really encompass all of the biochemistry material I have learned over my undergraduate career. Too much focus was on proteogenomics and amino acid synthesis without incorporating metabolic pathways such as TCA or photosynthesis.
- It certainly required the culmination of all skills developed both inside and out of the major. It took up a lot of time and required a lot of discussion on research methods, importance of information, etc. which is very similar to the type of discussions that take place when performing real research projects.
- I think the final project was a very interesting topic which was fun and informative to investigate. Future students may hate me for this but if anything, I think that it could be expanded to make it larger and longer. Examining one amino acid in one enzyme is not enough work per person. I think that the assignment could be expanded to one amino acid pathway per person rather than one enzyme. Much of the time sink for the project was figuring out how to get data from the website and the type of analysis we wanted to do. I think that analyzing five enzymes rather than one would only take 150% not 500% of the time commitment. It could lead to stronger results and expand the scope of the project. We expanded our analysis in other ways, mainly by analyzing large amounts of related enzymes. I think that annotated genomes like the one we ended up doing are better for supporting or disproving the hypothesis. It was much easier when we could see the annotated genes and then pick the most closely related enzymes rather than trying to blast sequences against the genome hoping to get a match. However, blasting unknown sequences may also have some value, I think possibly as some addition to the project rather than the main organism. Basically I think the project is great, I just think it could be expanded in scope slightly. With an annotated genome, and automatically generated statistics, it is very quick to check the amino acid content of a particular enzyme. With one pathway per group member maybe it would be possible to have the question revolve around the idea that this observation occurs, but to what extent? Thermophiles are GC rich, so would GC rich amino acid pathways show less selective elimination? Would amino acids like proline which are particularly important to structure maintenance show less elimination? What about pathways where the enzymes are used to synthesize several amino acids rather than the ones with pathways specific to their own? Will the pathway for tyrosine be low in phenylalanine? I think a broader based examination would provide many more interesting questions to be both asked and answered.

QID 3611 - Open Mic. Reflect on the course and identify those aspects that you like or think could be improved. Please suggest ways for improvement.

Responses (18 of 25)

- I've said all that I have to say. Dr. White has developed another truly amazing course that achieves the absolute most possible for his students.
- I feel the class overall was well done. I enjoyed the mix of case studies and lecturing. I feel that a lot was learned in this class, and the information learned will be retained better than most other classes.
- It was a great course, which is saying a lot because I really do not like the PBL learning format. I would just say change PBL altogether, but other than that it was good.
- Excellent course. My only regret is that I did not have more time to dedicate to this course because of my busy schedule. I love the course material but I was not always able to fully appreciate it and explore it in greater detail because the course was very time-consuming. The only improvement I would suggest would be to nudge people to get started on the final project a little earlier, even though it is clearly stated on the syllabus. It took a good bit of time to complete that project. Otherwise, no recommendations for improvement. The course was very well structured.
- I would love to take this class by itself. A senior biochemistry major has 438290 things going on, and makes it hard to devote the time necessary to get everything out of this course. I really enjoyed it a lot, and almost wish I could take it again because I feel as though there is so much information to be learned and so many things that I may have missed. While this isn't probable because it is part of the undergrad biochem curriculum, it is just a thought. Other than that, I found the course extremely valuable.
- The final project was too long for so small a time frame. The instructions were vague as to what analysis and information was required in the report. You had to read lengthy papers to figure out what was required for the assignment, which slows you down for such a large project. When I get an assignment, I like to know what the requirements are not figure them out as I go, which sometimes requires more time to change pathways.
- Learned a lot. a bit overwhelming at times with how interwoven everything is, but again, really helped me to develop my understanding of how interwoven everything is
- The use of problem-based learning stimulates student investigation of concepts that particularly interest them. It is taught in such a way that many hours are required outside of the classroom to not only learn the basic information but also to prepare for the specific case-studies. The lectures provided direction for the course but I often felt as though I was teaching myself out of the textbook rather than learning from the in-class discussions.
- This is by far my favorite course that I have taken in my studies thus far. My only real problem with this course is that it is so early in the morning and with so many labor intensive studies as a biochemist major I am often working into the wee hours of the night and even into the early morning so I miss class frequently on behalf of sheer exhaustion. I also believe that Professor White should lecture more than he did this semester because he has a supreme amount of knowledge and even if the course lecture was unstructured the knowledge gained by the students listening to his lecture would be far superior to groups bouncing ideas off of each other.
- homework either needs to be worth more or cut back on as it was very frustrating to spend so much time on the problem sets and then have it be such a small portion of the grade.

- I enjoyed the problem-based learning, but think that lectures would have been more valuable use of class time. I believe that if rigorous projects, similar to the final project, were assigned throughout the semester, students would take the initiative and complete the problem-based learning components outside of class.
- I really liked the format where Dr. White would lecture some days, and other days it would be PBL format. I wish he would of went over the case study summaries more with the entire class so everyone was on the same page. I liked how he would visit each group and help the groups work together and think about the issue.
- I would suggest incorporating a class to work on the projects earlier in the semester.
- I thoroughly enjoyed it and learned an immense amount of information. I like how Dr. White relates most material to real life experiences, findings and uses, that fact is what kept me so interested in the course. I think one room for improvement is to have students show up on time so that the class doesn't get behind schedule due to late starts.
- B
- Specify how you assembled groups to the class. If it is random, then assign groups randomly live in class so students are aware of how they categorized.
- I think the course is great. Perhaps having two review sessions before each exam could be helpful due to conflicting schedules.
- Main improvements are just the Sigma pathway and expanding the final project.