# Detailed Opinions

## SENIOR CLASS 2008
### *Students opinions gathered the last day of class.*

This semester has been action-packed. Sometimes I wonder if I have time to do all the things that I am supposed to get done. But then I realize that spending time wondering will not get those things done. Capstone has been a difficult experience, but it has also been a rewarding experience. I am excited for the presentations... excited to let other students and industry know what we have been working on... and excited to hear other students give their presentations. This capstone project is definitely the largest assignment I have ever worked on. This is preparing me for industry better than any other class.

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Anyhow so I'm just working on Capstone and trying to make the changes that need to be made. I wish I knew I sucked at life earlier like around Spring Break time. So then when I was down and out about the report and my other class big project being due right on top of each other and finding out that there wasn't a scanner at work so I wasn't going to be able to turn in an assignment because the computer lab's always over crowded and the computers are always locked so I can never get on one to do any work unless I get up there early in the morning.

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This class has definitely made me a better engineer and a better person. Before capstone, my academic experience was limited to classes and small projects. Capstone reminded me more of my internship last summer than a class. The process of continually revising, improving, modifying, and striving for flawless results over a long period of time is what happens in industry. This class has prepared me for industry more than any other class. I feel more confident in my engineering abilities now that I have worked on progressive distillation.

The practice of actually applying knowledge learned in other classes was one of the best parts of the class. Presenting every couple weeks helped develop my presentation skills. Capstone was unique from any other class because I had to manage working on simulations and details while at the same time keeping a view of where the overall project was headed and what physical results could be produced. This is similar to managing scope and depth. I anticipate scope and depth as very important issues to consider in the workplace. I will enter my job with xxx  with these concepts in my head and I will be able to consciously determine if I am balancing scope and depth in the projects that I am working on.

Effective time management and planning were skills that I have been developing ever since starting college, but capstone required me to test my boundaries. I learned that I have a tendency to get personally attached to projects or certain simulations. This was good at times, but at other times it lead me to work on certain simulations for long stretches.

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Has this class made you a better engineer? How much you feel you are more an engineer than an engineering student compared to when you started?

2)     Would you agree that the strive for rigorous results has taught you professional attitude?

3)    Have you learned to manage  scope and depth?

4)     Is the delivery of the results (presentations/posters) a process that has taught you something?

5)    What is your opinion about the relentless pursue of flawless (not necessarily optimal) results? Did this taught you something?

6)    Other comments about the class, how it should be run, etc.  I heard abolut homework, and quizzes enough. Be constructive because if you do, I try to change..

<mark>ANSWERS</mark>

1)    Yes this class has made me a better engineer.  Having to figure out the project more or less on my own definitely added to my engineering skills, and having to learn a new computer program that nobody else uses the same way we needed to with no help files was definitely a skill building experience.  I remember watching the capstone presentations when I was a junior and being absolutely terrified, but it's amazing how much you learn through the process and how much you can accomplish.  We are pushed to our limits and are able to do something that I thought was impossible.

2.) No, I think that the push for results forces people to fudge things and make unethical decisions to produce some sort of answer.  Usually it's not simplifying assumptions that are made which would just give a less accurate result, but it is fabrication.

3.) Yes.  In order to create a project you have to make decisions about what you want to do and this dictates how detailed you can be in the amount of time given.  …..

4.) Sure.  I liked the poster session afterwards it gave people a chance to ask specific questions and gave us a chance to explain our work.  The series of presentations helped A LOT with the production of the final presentation.

5.) I have a very similar answer as my answer to #2.  I think the push for results backs people into a corner and they panic and fudge in order to get results.  I think there should be more emphasis on the method.

6.) I'm not really sure why there is a lecture for this, there doesn't need to be.  The private meetings are good and the presentations are a necessity.  The worst thing is all of the uncertainty in the beginning. We will work really, really, really hard on something and then come in and show it to you and you say I like what you have done, but we cannot use it.  There were a lot of projects that took completely different directions many times.  This leads to a lot of wasted time and effort.  I realize that it is often difficult to know exactly where a project is headed when it is started, but more certainty would be nice.  I feel like

the initial descriptions of the projects when we were choosing ended up
not having anything to do with what the projects ended up being.  Even the
paper that you gave Taren and I to read initially had absolutely nothing
to with our project.  For the most part the TA's are worthless.  They need
to have some knowledge of the project in order to be any help.  All in all
capstone was a good experience.  I learned a lot, I accomplished a lot,
and I am very proud of the project I produced.  It was a great year and I
have come out with some excellent friends.

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I have learnt a lot about time management from taking this class. The most important thing I will take away from this class is having a reason for everything that is done or not done. I hope my grade will reflect the effort put it into the completion of the project.

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This capstone, seemingly endless work is done. The amount of work and labor has changed my life this semester completely. I learned that I did not have any freedom during the semester to work on the project. I feel that I can respect most of engineers who dedicate their life for better society which we are enjoying right now. I am also glad that I had a marvelous experience that I never had before although I do not want to experience anymore like this semester.

This capstone project taught me the responsibility of being an engineer. Everything I decided and worked is heavily burden on me. However, the result which I've got from the hard labor and labor was sweet.

The rigorous results have taught me how to handle the problem solving in any confliction. No begging and whining were accepted. The more I dived into the subject to solve the problem, the more difficult problem I faced on. There was a quote pasted on the refrigerator in my house. "Perseverance is a sign of someone who is too stupid to know when to quit." The degree of scope of depth I have dug in the subject was based on the deadline. If I had more deadline, I usually develop more concept.

I thought that it was enough for engineers just to be good at math and science. I was also one of the stereo-typed people that I don't need a good vocabulary to be a engineer. My presumption was totally wrong.  The way of delivery of the result to impress people requires lots of endeavor and skills. I am glad that I was taught by chemical engineering professors how to present my results to them from the beginning.

The relentless pursuing the flawless result makes me more perfectionism. The positive part is that this pursuing makes the solution more realistic by eliminating one of the many assumptions which were made in order to solve the problems easier. The drawback is that I wasted lots of times to find the 'stepping stone' to initiate solving the problem. It kills my grade on other classes too. I wish I could only take a capstone class rather than take it with other classes.

It could be faster and smooth progression if I already knew the computer programs that I used in the project. It was literally short of time to figure out the problem in the project along with learning the program by myself. I hope there is the class for learning the programs so that students are familiar with using the programs.

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1) Has this class made you a better engineer? How much you feel you are more an engineer than an engineering student compared to when you started?

Yes, this class has made me think of a more well-rounded approach to engineering problems. I try to consider the effects of what I'm doing, along with the limitations, rather than simply trying to find the quickest solution.

2) Would you agree that the strive for rigorous results has taught you professional attitude?
Yes.

3) Have you learned to manage scope and depth?

Not really - it's kind of hard to see the scope and depth throughout the semester.

4) Is the delivery of the results (presentations/posters) a process that has taught you something?

Yes, it's great to have so many presentations, because it teaches you that being fully prepared (as in at the final presentation) enables you to speak with confidence.

5) What is your opinion about the relentless pursue of flawless (not necessarily optimal) results? Did this taught you something?

It taught me to consider my results a little better instead of just taking them at face value.

6) Other comments about the class, how it should be run, etc. I heard abolut homework, and quizzes enough. Be constructive because if you do, I try to change..

I think we need more notice about additional requirements, such as making posters and writing the executive summary. I know that we had a week or more's notice for the poster, but when it's crunch time, a week isn't much. And finding out about the exectutive summary the day it was due was somewhat frustrating. But I know that the project was better for it. It's just been extremely difficult juggling capstone with my other classes (I'm not exactly taking a light load this semester) and of course capstone always won, so my other classes have suffered from inattention. Thank you for all of the time you've invested in us...I'm sure it hasn't been easy!

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I would suggest that you keep all projects between two people rather than
three. It would increase the focus between group members and not create
any favoritism amongst each other. I know in the real world you don't have
a choice but with other classes and grades playing a factor, it would be
easier to see where most of the effort is coming from.
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I would not change anything else about your class because I feel it
achieves everything it set out to do. prepare us for rigorous work,
deadlines, changes e.t.c.


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Thank you very much for the opportunity you gave us to grow under your training. Overall the
class was an eye opener. During the 1st class we had with you, some alumni gave very positive
comments about the class and I do not believe that I will also be giving one also.

I think the assignments taught me how to use PRO II better even though I was part of those that
nagged about it! The Capstone process went so well. Sometimes I would got mad and asked
"why will Dr. Bagajewicz sit and watch us make mistakes and not tell us about it until we present
to me". I think a reason for that is that you wanted us to better understand the dynamics of the
work we were doing! Thank you.

My advice to the incoming seniors...."please please do not be scared of the magnitude of work
you think you will be doing, think about how it makes you a better chemical engineer.....it helps
trust me"

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I would like to offer a suggestion for future capstone classes. I believe that peer ratings
should be incorporated into the final decision. It is my opinion that we can provide more
scope about what type of work is going on in the senior lab.

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Next year, I think that peer evaluations should also be group on group evaluations. There is alot
of unseen issues happening that you aren't able to know about, but if we were to evaluate other
groups you would be able to know about these issues. All of us seniors practically live together in
the senior lab so we know who is doing quality work and who isn't. I think that you should take
into account our rankings of other groups when making grading and AWARD decisions.


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As far as changes that could be made in how the course is run in the
future, I think it might be useful to consider that the final semester of
the chemical engineering program is the semester where students are most
likely to have dissimilar schedules in the division of the class into
groups.  Assigning groups based on project interest is good, but it may be
more important to project success that all team members have convenient
times to work on the project.  Perhaps the students in forthcoming years
could fill out a schedule with the times they are most likely to be free
outside of class and the schedule could be a contributing weight toward
group assignment.


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I have to say that this class has made me a better engineer if nothing else because my basic
research skills have been sharpened.  There is an incredible amount of information available to
engineers, and it can be overwhelming to sift through what is useful and what is credible both
quickly and efficiently.  There is also a prevailing college mindset that "if it's not on Google, it
doesn't exist."  Our report included a number of citations from books from our library and from

articles available on Web of Science.  The ability to find information outside of a quick and simple Google search will be a great tool for my future career.

I remember Dr. Nollert once talking about a graduate student presenting his research and the way in which he answered questions about his research.  Dr. Nollert was not disappointed in the student's research, but he was disappointed in the fact that, when responding to questions, the graduate student answered as a *student* and not as a *peer*.  After this class and the other courses I have completed in my career in chemical engineering, I feel much more confident in talking with other engineers as a peer and not as a student.

When I think about how rigorous the course was and whether or not the load should be lightened, my initial feeling is to say yes.  My first response is to suggest eliminating assignments and to only focus on the project.  While that might produce better projects, it might also hurt the quality of our chemical engineering program.  I know of another engineering student in another department (not chem e) that will be taking an internship this summer with a respected company performing optimizations on a chemical process.  The student has no experience with chemical processes and actually asked me for some advice on constructing a model of the process so that he could perform a sensitivity analysis on process parameters.  Although I was happy to help, I couldn't help but think "why isn't a chemical engineer doing this job?  we have both the background and technical skill to perform optimizations on chemical processes better than anyone else."  The problem is, if the assignments (mainly optimizations) are eliminated, we lose that edge and have no claim on those types of jobs.  If we're going to stay the best, we're going to have to continue to pay the price necessary to ensure we have *all* of our skills sharpened.

Finally, I would like to say that I am proud to have been trained as an engineer at the University of Oklahoma, and I am encouraged by the other engineers that have made that journey with me.  I know that in the coming years, no matter what direction everyone goes, I will still be hearing thier names as they make decisions and produce innovations that will shape the future of our country and world.  That doesn't happen without outstanding professors and faculty, and although we deserve credit for the hard work we have put into obtaining our degrees, our success is a direct reflection of the guidance and instruction from the CBME staff.  Thank you for your dedication to the students!

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1) Has this class made you a better engineer? How much you feel you are more an engineer than an engineering student compared to when you started?

   The **class made me a better engineer because the work was more practical than traditional text book studies. The work done in capstone closely resembled  my pervious internship experiences, however, those projects were more practical in structure.**

2) Would  you agree that the strive for rigorous results  has taught you professional attitude?

   **Throughout the course we were reminded to keep a professional attitude.  The depth of striving was contingent upon my schedule of other courses though. I believe the work expectation and dedication to the capstone course caused my performance in**

**other classes to be lower than I would have liked. No amount to time management could cure that.**

3) Have you learned to manage scope and depth? **Yes, we put a lot of emphasis on thorough explanations.**

4) Is the delivery of the results (presentations/posters) a process that has taught you something? **Yes, I thought the one on one meet the author session allowed for us to really show our knowledge of our project to new audiences.**

5) What is your opinion about the relentless pursue of flawless (not necessarily optimal) results? Did this taught you something? **I think that some of the deadlines were inconsiderate of student schedules. This defiantly impacted by professionalism in thoroughly completing capstone related work. Reasonable deadlines will yield better student performance. Personally, I feel as if the scope of what you were wanting for our project was not fully explained to us until our 3rd presentation. By this time we were a month or so into the class. Our project closely mimicked the xxxx project, but our work did not take that route until a month after that group was well established, so we remained to have a less developed projects than ones that were similar to ours. Not to mention we had critical issues with the GAMS program to held us back for a few weeks. I believe that we could have generated a more in-depth project had the specifications been clearer initially.**

6) Other comments about the class, how it should be run, etc. I heard about homework, and quizzes enough. Be constructive because if you do, I try to change.. **These are general statements based on my class observations and may no necessarily be applicable to me and my project. Several of the project descriptions given at the start of class are very ambiguous, and several students end up working on things they have no interest in. Mine was fairly clear. You change the direction of the projects several times causing student to have to start from scratch or disregard weeks of work that had previously been done. I know these are realistic situations, however, we still had several other things such as classes, jobs, relocation, and graduation to concentrate on. Too many emails!!! I was not uncommon to get several emails from in a row all related to the same topic. Open a new message and type need to know things in it throughout the day sending no more than one or two class emails a day. Maybe one at noon and one at midnight. Six a day is entirely too much and decreases the chances that I will catch important details.**

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Has this class made you a better engineer? How much you feel you are more an engineer than an engineering student compared to when you started?

This class has taught me to always go after problems I have and actually fix them, as opposed to ignoring them in previous classes. Sometimes this sucks because they don't always have solutions, but there isn't much that can be done about that.

2) Would you agree that the strive for rigorous results has taught you professional attitude?

You definitely strive for rigorous results. My professional attitude hasn't really changed because in real world work I have always striven for rigorous results. I have learned how to better allocate my time because of it.

3) Have you learned to manage scope and depth?

I feel like my project was very deep. I also use Scope in the morning and before I go to bed. I like it better than Listeine. Honestly I feel like our project was both wide in scope but also deep in evaluation, so I'm not sure how to answer this problem.

4) Is the delivery of the results (presentations/posters) a process that has taught you something?

Xxx and I decided not to ever practice our presentations. We wanted to be at a point where we knew enough about the information to each be able to present about whatever we had put on the slides at any point. It made us have to know our stuff, and I think I will continue to use this approach to give presentations in the future.

5) What is your opinion about the relentless pursue of flawless (not necessarily optimal) results? Did this taught you something?

I would say read the first paragraph I wrote

6) Other comments about the class, how it should be run, etc. I heard abolut homework, and quizzes enough. Be constructive because if you do, I try to change..

Decide what exactly it is you want from the students earlier. I feel like on several occasions I suffered setbacks because I finished something early. If you have guidelines for homework, or presentations, or papers, or anything else that is to be turned in, give it to the students up front, because a lot of time can be wasted in reformatting, rewriting, and reorganizing problems. This time could instead be used to develop a better product.
I like the way the biweekly presentations are set up, that was very useful.
I'm not sure I don't think a push towards less petroleum, more bio is a good idea. I think the option should be given to people, but because the majority of us are chemical engineers, its more useful for us to investigate chemical engineering problems. It is true that a separate major should be started for just bioengineering, but we already waste a lot of our time doing technical writing, engineering practice, circuits, statics, physical chemistry, and numerical methods that we barely have enough time to cover the

important stuff (Mo-heat, Thermo, Kinetics, etc.) that we shouldn't take away any more from a fundamental chemical engineering curriculum than we already do.

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I have learned a lot through the experience of this class: things about managing scope and depth, things about producing results, and things about working with people. I have also learned about managing time effectively and soliciting input from others. I think I have grown as an engineer over the course of the semester and will take lessons learned from this class into my career as an engineer.

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A performance check list with presentation comments could be given after presentations to let us know what you are looking for and grading in regards to the presentations so issues can be fixed earlier on in the semester.

More computers in the senior lab because there aren't enough for everyone and people consistently lock their computers when they aren't in the lab so no one else can use them. Maybe a no lock policy. This is extremely frustrating.

Subscriptions to marketing research papers for those doing consumer related projects.

Keys to the building because many times I wanted to come work on my project after going out on a Thursday/Friday/Saturday night and the outside doors were locked so I couldn't work in a studious environment and ended up going to sleep or out to eat.

More outlets so when I had to bring a laptop there would be enough.

Extend the first project deadline to the middle of Spring break.

Having journals consistently due on the same day once a week because the haphazardness of it just made me forget to do them. I don't even think I had two presentations that were at the same time on the same day, so I really would forget to do them because I had other things on my mind in regards to shuffling my schedule and other work that was dedicated to that time frame. I would just forget all about the journals.

Emails that don't all have the same subject heading. I ignored all of the "groups are posted" emails until I realized that despite the subject the content was different.

Having set questions for peer review that are due before the presentation and sharing the results with the group members during conferencing.

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One suggestion that I thought of was that before group members are officially assigned, each person should get a preview of the people they

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might be grouped with.  This could be done in a sneaky way, like each
person gets a list of 5 people (which includes the 1 or 2 people that they
might actually be grouped with) and the person comments on or rates how
compatible they would be with each listed person.  Project topics would
not be part of this list. Then the feedback is taken into account in
conjunction with the project topic preferences.
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1) Has this class made you a better engineer? How much you feel you are more an engineer than an engineering student compared to when you started?

It has taught me how to deal with difficult situations and it has made me a stronger person. It also helped me to realize that I can do anything that I put my mind to. This class made me think about problems and solve them myself. I think I have become an engineer with a hard backbone.

2) Would you agree that the strive for rigorous results has taught you professional attitude?

I'm not sure if it taught me professional attitude. I would like to think that after being in the corporate world for 3 summers, I know how to have a professional attitude.

3) Have you learned to manage scope and depth?

Yes, but I still have a hard time with leaving things as are even though they are not 100% correct. I will probably never be okay with that though.

4) Is the delivery of the results (presentations/posters) a process that has taught you something?

Yes, it taught me to approach presentations with a broader audience in mind rather than someone who knows as much as me.

5) What is your opinion about the relentless pursue of flawless (not necessarily optimal) results? Did this taught you something?

This is the same as above. My relentless pursue drove me crazy. I am not one who does not like to turn in something without it being optimal and flawless. This is something that I have to work on because time constraints do not allow for flawless optimal results most of the time.

6) Other comments about the class, how it should be run, etc.  I heard about homework, and quizzes enough. Be constructive because if you do, I try to change.

I think that the quizzes are a good idea because it makes us remember things that we have already done. The information that is given in class is somewhat unclear a lot of the time. I am still real unsure about how to handle uncertainty. I think it would be valuable to

spend more time on this. It is going to take experimenting with different plans to get it right though, and just because it was the correct approach for one class... DOESN'T mean it is the correct approach for the next class.

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I feel like I have maybe struggled more with this class than anyone else this year. I started out in a group where we both lacked the motivation to succeed. I applied myself at the end with bad results and a decent paper and he did the same thing. The information given to us was basically regurgitated into a paper resembling a mix of the previous ones. His numbers all came from spreadsheets given to us and my numbers were calculated with a good deal of error. I think I may have been accused of making the first project fail by my partner. He got to join a group that was basically done with their project and had an easier time after spring break. You chose to start me on my own project (I know I was not the only one), but he got to join in on an ongoing project with two people already in the group. I guess I am bitter that I had to work so hard for my results and from what I could tell he did not. Even in other groups that were split up, some members got to join existing groups with projects nearly completed. I guess that sometimes peer reviews can be used to identify who is not working, but sometimes they can be used to blame other people for stuff that was equally their fault. I don't know if he actually said anything negative about me, but the way I was treated afterward compared to him made me a little upset. Now that I got that off my chest I will answer the questions in detail.

This class has definitely made me a better engineer. I've never had to look outside of a textbook in an engineering class before (except maybe UnitOps and Design labs). This showed me how much I can learn and access to new ideas I can find by reading journals and engineering books. Even just news articles can be a help, I've never really tried to keep up with current events. I started out in this major not knowing what to expect. I had changed my major from PreMed/xxx after my sophomore year and wanted an engineering major, so I transferred to ChemE because I already had some of the chemistry out of the way. I was stunned by the increased workload and struggled more than I had in my entire life. After acclimating to this lifestyle I saw an increase in my grades and finally felt that I could do this type of work. I now know where to look for answers and who to seek out with my problems. I think that as an engineer I will excel, at least after a few years of getting used to working a designated set of hours everyday.

I think that working toward my results I kind of tested the waters with you. After, spring break I thought that there was some way I could not do a project and still pass, but you set me straight after a few days. I still complained and fought you, but eventually accepted that this is what I have to do and I did it. I hope that this will not always be the result of being assigned a project and I don't think it will be. I know what I am capable of now and this will help me to be a better person and engineer. I also think that being in school for so long as made me accustomed to an almost easy life. My parents help me with tuition and I only work a little bit during the semesters because of this. If I had to stay another year I don't know what would happen, but now that I am leaving I will have a purpose and drive to make a better life.

My attitude has improved even it was only in the last few weeks. I just needed some help. Most professors would not do this, but you really made it personal and were always there for support and advice. You are the first professor that I talked to regularly, mostly because I always felt that I was bothering the others.

I think that if I had had better results by the time the presentations were performed I could have done a great job with the presentations. I used to be unable to speak in front of people and even now still have some trouble, but I am on my way. I experienced presenting results in the lab courses, but they were not on the scale that these results were. Even though I spent most of my hours on this project on the latter end of the timescale, I did strive for results almost nonstop.

Plugging through old spreadsheets is one of the hardest parts of this class.  Even though my results are not the best, they are my results and I am proud of them.

As far as the rest of the class goes, I think it is almost right.  The tests are necessary, I understand, to refresh the students with what they have learned over the years.  The homework seemed a little long for someone working on it alone, but it did help me learn about PROII.  The lectures are so long although the break in the middle is nice and the once a week meeting is great also.

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1)  I think this class has made me a better engineer. Has taught me time management, prioritizing, and how to formulate a solution from very little information know.
   2) I do not think the rigorous results has taught me a professional attitude. I feel like I already had a professional attitude from my past professional experiences especially from my internships. I think the rigorous results helped with time management. But it was a little bit exhausting and frustrating.
   3) I think I have learned scope and depth to a certain degree, but still seems like we still did alot of both.
    4) I think the delivery of results has taught alot. It helps in preparing for the most important part which is the ability to communicate the results and get your point across to your audience.
   5) The pursuit of flawness helps in teaching you not only your own faults but also to process to avoid flaws and what to look for to find your errors.
   6) It didn't affect me, but I think the bio-projects need better TAs for their projects. Some may or may not be as helpful as they need to be. Also a clearer statements for the projects.

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I believe this class has made me a better engineer.  It gave me the opportunity to take all of my engineering skills and practice I have spent hundreds of hours learning to good use.  I liked that we were able to focus singularly on one project (excluding the homework and quizzes) for the entire semester.  I think this is great practice for industry and actually what a job will be like.

One of my major frustrations with this class is the heavy emphasis on results.  I feel like sometimes there is so much emphasis on results that the method is neglected.  I know several groups felt like it didn't matter how they got answers as long as they did.  I think this class should focus more on methods.  I know in our project, for example, the major point was the method not the results.  But, when it came down to the end we were forced to work nonstop with our really good mathematical model that we spent so much time constructing to force bad inconsistent data and parameters to work.  This was really unnecessary.  We accomplished establishing a model that works and even thought the numbers didn't look great, it still worked.  The numbers were bad not due to problems with the model, but with data problems.  A company or organization that would use this model would actually have good data, unlike us.

I think our project definitely stretched the concept of limiting scope and depth. We did our very best to incorporate everything we could think of in the time required. Then, once we actually accomplished these things after working ridiculous numbers of hours, we were given another huge task.

My number one problem with this class is that it has graduate level expectations for an undergraduate class. These expectations are unreasonable at times. I was a lucky and rare student that was only enrolled in 6 hours this semester and I still struggled to handle the workload. I have never spent more time and worked harder on something in my entire life. I guarantee you I put at least 50 hours per week into this class. And, I am not unique. This class forces you to put that kind of time into your project. I know students that carried 16 hours this semester and I think it is absolutely heinous that these students were forced to put this kind of time into their capstone class. The chemical engineering curriculum suggests 12 hours for this semester. I think that is wrong! I cannot imagine how the students did in their other classes. I simply think this is unfair.

One of my favorite parts of the class, however, is the care taken in learning the needs of individual students. I really enjoyed getting to know you and truly appreciated the amount of time you were willing to put into this class. For all of the complaints about how much time is required for the students, I also think you put in ridiculously too much time for this class. It HAS to be outside the job description for you to be at school at 11 p.m.- I know it is. If it is going to stay at this level of intensity then I think a few things should happen.  1.) They should hire you an assistant and 2.) They should condense some of the earlier classes (i.e. numerical methods, engineering practice, intro to engineering) and let the workload be about 6 hours for the final semester and 3.) Students should be both taught GAMS and be told exactly what the projects require (percentage GAMS work, percentage Pro II, etc.).


Alright, I think this is it.  Thanks Bagz!  I'll miss you!


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I think the class is very important for graduating seniors and I hope you
continue to make the class a rigorous test of the students skills as an
engineer. I wouldn't skimp on the homework, the quizzes, and even the
lectures. The homework is absolutely vital and GAMS should be added at the
start of the semester. Quizzes should have been continued and included
kinetics and design subject material. The lectures are the most
questionable part, but the information learned such as pinch analysis is
vital. I think that a fair number of people who slip through the cracks as
far as workload, but that may be unavoidable for many reasons. Don't
overwork yourself. I admire your vigor and zealousness in teaching the
class, but even you need to have a respite every once in a while. Overall,
the class and most of the projects turned out excellent so I just want to
encourage you to continue to foster excellence in your capstone class.
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   I'm honestly wondering that myself, if I'm a better engineer.  I actually think being partnered with a good partnered with Xxxx might have made me a better engineer, because he had a lot of interesting thoughts, and had a higher level of interest than my first partner.  So, I learned alot from him.

I think the homeworks, were really time consuming.  But, in terms of learning Pro-II, they were probably helpful.

I think I learned that keeping going is important even though you feel like you don't really understand fully what is happening, you have to keep going, and then you progressively learn more, even though you thought it was impossible.

That's all I can think of right now.  But I promise to email more ,when I think of something more constructive.


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1) I don't feel that this class has made me a better engineer necessarily. It seems like a lot more was demanded than what would happen at a job. For my project, I heard a lot about how it wouldn't work from people who studied yyyyyyy, and it turns out that they were right.

2) I'm not sure hard work is all there is to professional attitude, I think an engineer needs to be able to look at a problem and figure out if it has potential before spending months working on it. In this class I learned to work really hard on a project most engineers would probably discard after a couple of weeks.

3)I feel that the scope and depth of my project is much deeper than it needed to be, however, I have learned about comparing different processes and thinking of new ways to do things.

4) I found that the presentations/posters were very stressful, and that I need to find a boss who doesn't give a lot of new work the weekend before a presentation. I think most people would have everything done the weekend before, and just be practicing it, at least that's what I experienced at (Company name), and in other classes.

5) The class has made me realize relentless pursuit of results may not be the best approach to a problem, instead a problem should be evaluated quickly to see if it has any merit worth pursuing more deeply.

6)The grading in the class seems to be purely subjective, based entirely on how much time you think a student has spent working on the project. Also, it seems you are able to scrutinize and hold oil/natural gas projects to a higher standard than bio projects, since bio is not your area of expertise.


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I feel in some ways like this class ahd made me a better engineer but in other ways it has not. I definitely know the feeling of having tight deadlines and have to get a ton of work done in a very short time, so I guess I know how to optimize my time. However, I didn't feel like this project particularly helped my technical knowledge of chemical engineering. Learning about vvvvvvvv was helpful, but so much of the time spent on this project was wrestling with GAMS or looking up necessary data. Due to the mundane nature of this work, I don't feel that it really increased my professional attitude except that I guess we have to do a good job on whatever we do no matter how inane the task might be. I really enjoyed the principles of the Biorefinery project and remain very interested in the field of alternative energy developments, but I didn't not really enjoy the direction this project took after spring break (focusing on economics) as I have always very much enjoyed the technical aspects of chemical engineering over the economics, but I suppose having

this experience might be useful at my job. The delivery of our results was fulfilling in that we were done with the project, but the GAMS model was so difficult to deal with sometimes, our confidence in the results was often shaky until the very end of the semester. The idea of pursuing flawless results seems ridiculous to consider for such broad projects examined for only four months. I guess we learned that it is important to work quickly and efficiently without getting obsessed with details, but that's where the flaws come in.... Anyway, I guess that is all for now.

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I would say the class made me a better engineer in the sense that I was forced to work harder and think things through a lot more. This would be helpful in my professional career. My only problem with the class is the time. It seems, in our project anyways, we started with a lot of basic things and did not get to the "meat" of our project till the very end. I guess our scope and depth focus was a bit off. There was no time to obtain all the data we needed to completely "nail" the project. There should definitely not be homework after spring break, and maybe only one homework or none the whole semester. The quizzes are definitely helpful and should be left in there, as they are a good refresher. Overall, the class was intense, painful, annoying, hair pulling, but it makes the finish line that much sweeter.

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*Has this class made you a better engineer?*

 I don't think I can answer this question just yet. It's taught me about the importance of researching the problem and critical thinking. I also know that a big part of engineering is the ability to react to change. And with all the back-and-forth changes during the past few weeks, we all had to adjust. Then there's the simulation experience. I don't know if I would ever use PRO\II again, but it was an interesting experience. Theoretically, I think this class allowed me to hone useful engineering skills, but we will see after I put these to practice.

*How much you feel you are more an engineer than an engineering student compared to when you started?*

I'm not sure how to answer this other than a plain "more an engineer than an engineering student". But in some ways, there should be no difference. Both should be committed to continuous education, and both should strive for quality results.

*Would you agree that the strive for rigorous results has taught you professional attitude?*

I think it depends. In most instances, I learned to deal with the frustration and just learned to keep working at it until I get results. In other instances, I'd get tired of trying and just take the lazier route. Obviously, the latter isn't professional, but if my job or professional reputation were at stake, then I'd most likely take a less apathetic approach.

*Have you learned to manage scope and depth?*

I think I've managed depth more than scope with this project. I am personally the type of person who would rather know a lot about a concentrated subject than just a glossover, shallow knowledge of a broad subject. I wish I had learned to broaden it out. I think my perfectionist nature partly prevented me from pursuing other aspects of the project.

*Is the delivery of the results (presentations/posters) a process that has taught you something?*

I've already known that presentation makes a big difference. So it's nothing that I don't already know or practice. Whenever I see presentations with misspellings, they are like nails on a chalkboard for me. In fact, I attended a Brown Bag Seminar at Stephenson today where the presenter had several grammatical mistakes, and it's things like formatting and errors that give the impression of carelessness. If you do not pay attention to your presentation, then people might parallel that to the overall project. I already know the fundamentals of presentation, but what I learned this semester were just more tips to strengthen that.

*What is your opinion about the relentless pursuit of flawless (not necessarily optimal) results?*

I'm not sure if I totally understand this question; if something is flawless, it needs no further work or optimization, right? I think in some instances, this is a good method, but in others, it may not be the case. In industry, it costs money to run experiments. Sometimes, simulations may not be enough to get results; you'd have to work in the lab to get results. This is especially true for bioengineering projects. I've discussed this with other bio-option classmates. We feel that in order to truly validate our Capstone results, we would need to physically go into the lab to collect data.

*Did this teach you something?*

It taught me that I CAN survive on 2-3 hour sleeps for consecutive nights (without coffee or energy drinks because I hate those). I'm tempted to say that because this class wasn't technically challenging that I didn't learn anything, but I did learn how to multitask (since this was a busy semester for me) and how to be more inquisitive of things and not to take everything at face value.

*Other comments about the class, how it should be run, etc.*

I think your availability for your students is great, and I know you go the extra mile for us by choice, so that is greatly appreciated. I am a volunteer recruiter for the College of Engineering, and I like to spend extra time with prospective students, and I imagine that if I were in your situation, I, too, would hold office hours late into the night just to see the students' transformation.

What kind of irritated me this year was the lack of descriptive subject titles in your e-mails. You tell us to be specific in our e-mail subjects, yet you cannot uphold your own request all the time? I also get a lot of e-mails everyday, and I often arrange my inbox by sender to get what I need. So I think it would help out the students next year…

I would really like to see this Capstone class evolve into something like the A&E Capstone projects. They partner up with industry for projects. Not only do they get real, hands-on engineering experience, but it's also a way for them to network with industry. I understand that facility space, among others, would not be a viable option, but I think it would be a terrific way to teach students about chemical engineering. Maybe the companies can be local, and students can be shuttled to their facilities. For the bioengineering projects, perhaps students can be given a budget for the semester (maybe from a sponsoring company?), and they can use it to run experiments in the existing labs. They can learn about operating within a budget and have the freedom to collect such data.

From what I've heard from other students, it seems like this class is more results-oriented than quality-oriented. I've heard people say that they arbitrarily change numbers in their codes and spreadsheets in order to get reasonable results. I've also heard people say that they lied during their presentations and didn't receive negative feedback from you. So this gives the impression that results are more important than learning. Some people feel that because they're struggling to produce good results that they're not really learning. I'm not sure if anyone would explicitly say this in their journals, but I will speak on their behalf.

Finally, I would like to mention how this class help get me into graduate school.

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Yes, this class has made me a better engineer. I feel like I am a lot more of an engineering student now than before. Capstone forced me to be efficient with my time and to produce a lot of results within a short amount of time. I was exposed to programs I was never aware existed (i.e. SuperPro). In addition, I think that my presentation skills (creating, delivering, and professionalism) have also greatly developed and improved over the course of the semester. I think that the relentless pursuit of flawless results is something to strive for. It taught me that there is always some way to make something better than it already is. A project is never really fully complete. I think that the last couple of weeks after spring break definitely made our project and presentation look a lot more professional.

Overall, I like the way capstone is run. I don't really have any other comments.

I am just HAPPY that the end is near!! Thank you for being a great professor and devoting so much time to the students. I really appreciate everything that you do for us!


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 This class has made me a better engineer, I feel as if I am more confident in myself and definitely have improved my presentation skills. The reason for this, is the  hard work that I put in and you demanded from me. One of the important things I learned in this class that will help me be a better engineer is a way of finding the answer from resources that I have never used before, an example is working with other groups and TA's that were not assigned to my project. The most important concept this class taught me is that if you if have a positive attitude and put your mind towards the goal there is little you can not accomplish no matter how impossible it seems.

Although this class helped me become a better engineer, I do not feel like I got out of it the work that I put in. A lot of the work I did was mindless calculations and redoing previous work over and over again to get a better result. I also feel that the projects, that we do in this class are far more research based and help students become better grad. students than they do prepare them for industry. I don't know if it is possible, but other majors (Mechanical and Electrical Engineering) get companies to sponsor their projects, and work on problems that specific companies are having at this time. I feel that would prepare me much more for industry.

Yet, I may not totally agree with your teaching style, I feel as if I did learn a lot from this class and really appreciate the effort that you put in to this class. You have by far put in the most hours for the students of any professor I have had and are always there to answer questions / give advice.

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I don't believe this class has helped me become a better engineer. I feel like all of the hard work and motivation that I had during the semester was no more than I've had all along during my engineering curriculum. As for rigorous results, I made more assumptions during this project than I am normally comfortable with making b/c I knew that the numbers I was generating were not useful. .......... Ordinarily I would not have calculated these numbers at all if it weren't that we had to have something to show every other week and so I was forced to find something to present. Sometimes significant progress is not made between 2 weeks and it would have been nice if we would have had fewer presentations so that I did not feel that I was forced to come up with work to keep me busy just so that I would have something to show. Part of being an engineer is working efficiently and knowing what is useful to know and what is not. That being said, the rest of my results were reasonably credible and I think my project was of benefit. But I am accustomed to only doing work that I can be proud of, and I am no more proud of this work than I am of any of my other classes. Having the project to work on all semester was good for a capstone class. I am not sure that the homeworks were necessary, though the quizzes did help in reviewing other classes. I enjoyed the global warming presentation and would have liked to see more presentations of current events pertaining to chemical engineers. I would rather have more of that than a review about heat integration. Also, it was very difficult to fit everything that I did this semester in a 30 minute presentation at the end of the semester. I know I left a lot of it out. I think 45 minute presentations would be about the right length.

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1) Yes, I think so. I really thought the second part of the class (the part without homework and quizzes and lectures) was much more productive in making me feel more like an engineer and less like an engineering student. It was great to be just working on a project and applying the knowledge of how to solve problems and apply research methods. I think that's the best knowledge for engineers to have. So, for that reason I definitely liked the class better than other chemical engineering classes.

2) I don't exactly understand what you mean by "strive for rigorous results", but I'll interpret it this way: I understand working under pressure with limited information and time constraints and needing to deliver the best possible results, if that's what you mean. But I think what most prepared me to manage all that is my time as the Chair of E-Club events over the years. Those experiences are truly invaluable and I don't think they can be simulated in a classroom by even a capstone project. With this project, I do think you accomplished making us (me, but all students too I think) want to do well for more than just an "A" in a class. But with those other events, I needed to do well because the Dean, the companies sponsoring the event, the 40-500 students coming to the event, the engineering technical societies helping out, and the potential COE donors in attendance were counting on it. I think that fosters a professional attitude pretty quickly.

3) If I hadn't already, I definitely think I would have in this class. Or I would have gone crazy.

4) In that arena, I think practice makes perfect. So, yes.

5) I did like that we kept expanding and improving the same project throughout the semester. I think eventually you have to stop beating the dead horse. Maybe that's not the right expression; I just mean that I wouldn't want to spend my whole life on one thing, even if I could continue to improve it for eternity. The pursuit of excellence is worthwhile, though. I'm all for being awesome.

6) It was very good. I think the biweekly meetings and journals are an excellent idea. You seem swamped though, so maybe this class should be run by two professors. I suggest Dr. Sikasvitas. He has the same ability to make students want to do really well while also not-so-secretly hating him for making them want to do well. I think you two would make a good team. Also, I liked the idea of inviting industry reps to our presentations, but with two parallel sessions, it seemed some presentations got huge attendance and support, while others didn't even have a single professor attend. I think that should be remedied, if possible.

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1) Yes. I do not present well in presentations. I have a huge stage fright problem a year back. The worse case is that I paused for like 5 minutes with nothing to say. With this capstone, it really made me present better during presentations. I definitely feel more confident in myself when presenting myself to strangers.

2) Yes.

3) Somewhat.

4) Yes. I have learn that I should always cover all my "holes" during presentation so that my credibility does not get discredited during the presentation itself.

5) I learn to provide answers at the appropriate time. This class really showed that given more time, the answers coming from an engineer also becomes "better" in a way.

6) Maybe allow groups to actually conduct experiments to find out information that literature that cannot be found online.

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1. I think this class has improved my productivity. In that sense, it has improved me as an engineer. I personally prefer theoretical classes as opposed to practical classes. Perhaps that means I'm not ready to be an engineer yet.

2. Yes, I agree with that statement.

3. "Manage" is something of an overstatement. I learned to work as hard as is possible, and whatever scope and depth that is resultant is the best I can do. The best I can do is all I can offer.

4. Yes, any practice I can get presenting is beneficial to my professional abilities.

5. This pursuit can prove very trying at times, but on its own is a virtue. It is a hard semester anyway during our college career; the relentless anything is very much to ask. I learned to prioritize. Sometimes it's better to stop working for an afternoon and stay sane than to stay up all night and go crazy.

6. I felt out of place during the first part of the semester, having been added to what was essentially a personally requested project. I felt much better after joining xxxxx, which after all was one of my top choices to begin with.

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I have learned a lot about scope versus depth from my capstone project. It has taught me that you can't do everything when given a time constraint. I liked making the presentation and the poster for the final. I think it is a good way to show everyone what we have been working on all semester. I think that two presentations should not be going at the same time. This year there should have been three days of presentations instead of two. The "industry people" could have read the abstracts and then picked the ones they wanted to see, and all of those could have been on the same day. You can still only watch one presentation at a time. Three days would have been less hectic than two.

I think capstone should end at spring break. I would still want to work on projects, but with more refining of what we have already done ……… I understand your comment that the economics was not "enough chemical engineering"; however, I feel that I did not learn anything from working on a ……. for two weeks. …… My time would have been better spend by refining the economics instead of adding a new part to our project.

I do not want to become an engineer by title. I feel that a Chemical Engineer degree is just means to a different end for me. I would really like to go into business or the executive part of a large company. I do not want to size heat exchangers or work with technical equipment for the rest of my life. Therefore, I would have found working with economic market structures more beneficial for my future career.

This class has been a necessary evil, but I don't know if it was extremely important to my engineering future/career.

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- 1) Has this class made you a better engineer? How much you feel you are more an engineer than an engineering student compared to when you started?

  I believe it has made me a better engineer. It made me think like an engineer when trying to come up with a solution for a problem.

- 2) Would you agree that the strive for rigorous results has taught you professional attitude?

  I believe it has especially when dealing with my partner I had to make a lot of decisions and I believe this is what the professional world wants from me.

- 3) Have you learned to manage scope and depth?

  I think I have been able to manage scope but if there was more time I think I could have managed depth better.

- 4) Is the delivery of the results (presentations/posters) a process that has taught you something?

  I think presentations and posters help alot and makes it more professional.

- 5) What is your opinion about the relentless pursue of flawless (not necessarily optimal) results? Did this taught you something?

  Its hard but the end result has a great feeling.

- 6) Other comments about the class, how it should be run, etc.  I heard abolut homework, and quizzes enough. Be constructive because if you do, I try to change..

  I think the homework should be less or at least not due the same time as the presentations or the project is due.

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