

## **MECH-322/420 ANONYMOUS Q/A**

### **SPRING 2021**

Considering there is no opportunity to have me as a professor in the future, your comments are requested below to share with future MECH-322/420 students. Your comments are 100% **ANONYMOUS** and are submitted without names or email.

Often there is discussion regarding the development of independent thinkers and how to achieve? The development of the independent mindset is never achieved by providing all the questions and all the answers! All researchers will agree that at the beginning of any research endeavor that one will never know all the problems and will never have all the answers. But the hallmark of the independent mind is having a problem-solving mentality, having the ability to self-learn, having the ability to extrapolate data and to form conclusions, and having the fortitude to be unafraid to seek answers from multiple independent sources. Academic institutions at all levels have a formidable task for the 21<sup>st</sup> Century to transform student learners from an environment where “likes” and “dislikes” are more important than learning and demonstrated knowledge. Institutions that are successful will provide the next generation of independent thinkers that will face significant challenges in the next 20 years, considering the massive rate of technological advancement.

In the next 25 years, the world we will see a cure for Cancer, we will reach out and will start to colonize other planetary worlds, we will discover new materials that will forever change our understanding of physics, we will start to control and hopefully reverse the ravages of global warming and climate change, we will be able to see further back into the past than ever imagined and we will begin to understand the origins of “everything”. Academic leaders are faced with the challenge of teaching materials and concepts that have not changed for 100 years and are challenged to prepare students to solve problems that we cannot even imagine today, and to prepare students to develop and to use tools based upon concepts that have not even been conceived. We live in a daunting academic environment, and the only solution is to focus on student development that embraces discovery and inquiry, and to develop a mindset that “rejects” being told all the answers and to develop a mindset that expects to be challenged and to understand that it’s “ok” to not know the answers. Rather the most important skill that we can impart to students is to develop an understanding of the “*process and roadmap*” to find and to understand answers to unknown problems and questions, that we can only dream about today. It will be these students and these institutions that will contribute to the long-term survival and the universal expansion of humankind.

Thanks for completing and emailing back. Have a great educational and industrial career. Thank you for your time.

Please answer the following briefly:

1. Engineering design is the execution of applied physics for the development of technical solutions for challenges facing the survival of mankind, and the technical communications of those solutions. Please comment on if you think MECH-322/420 Fluids Mechanics/Heat Transfer and a focus on parametric thought has enhanced your skills and ability as a student, and as a future engineering professional, relative to engineering design thought and technical communications. Why or Why Not? Thank you.

- a. Applying a parametric style of analysis on the problems that were involved helped me develop new ways of thinking involving more than just the problems that I was given. The results that were given from the problems were not always straight forward for analysis which pushed me to find more creative ways to interpret them. I enjoyed seeing the effects on the model when variables were changed around and understanding how that could be useful in designing real world applications.
- b. MECH 420 has allowed me to think critically. By using the necessary tools, I can follow the path to find general and exact solutions. When I am faced with a future engineering problem, I can find a path to solve any type of problem. This course has given me the tools to find solutions and to solve problems.
- c. Yes, I think that MECH-420 and the focus on the parametric roadmap has enhanced my skills as an engineering professional. Having to solve long, tedious problems made me develop more efficient ways to solve problems and I think that is valuable in a career.
- d. I have had my fair share of challenging engineering courses throughout my time at Kettering, however, Fluid Mechanics and Heat Transfer have been by far the most challenging courses. I knew coming into these two courses I would be confronted with new difficult material, however I pushed myself to learn and understand as much of the course material I possibly could. Now that I have come through on the other side, I can positively say, yes, the focus on parametric thought has definitely enhanced my skills and ability as a student. Since the start of my academic career at Kettering I have always been pressured into always thinking of the right design and always coming to a specific answer. Fluid Mechanics and Heat Transfer allowed me to take some of that pressure off and digress my thoughts and ideas towards asking the right questions to come to a conclusion.
- e. MECH420 helped my understanding of basic engineering primarily because it is a critical component of mechanical design in general.
- f. Parametric thought is something that in the beginning causes a lot of struggle and brain power to overcome. This style of teaching is something that very few professors use and goes away from the style that I was grown up being taught how to learn. With this being said, I can see its use case in engineering course and IF implemented correctly can be very good. The ability to implement correctly is such a hard task it is often done poorly and can cause students more harm than good.
- g. These courses have enhanced my skills and ability as a student, MECH 320 isn't listed here but I think it is the one that helped me the most. The professor was amazing (Davis) and taught it very well setting us up as students for the first time, to apply the calculus we had been learning to real world applications we could be doing on the job.
- h. Yes. This class has enhanced my ability to think critically which, in my opinion, is the backbone of all these skills mentioned above. This class made me work hard to get solutions, a trait I will need for the rest of my career.

- i. I feel that this course has given me a lot of practice in solving seemingly impossible problems. This is necessary at work as I want to change the world, and that's going to take solving some tough problems. Additionally, the work with excel and how the answers to exams were to find the exact solution as a function, then check it with real values is very practical. Crunching numbers is not practical or engineering. But deriving equations is what the career is about.
- j. No, I think more time should be spent on doing problems because that is what will help us understand heat transfer, the parametric thought time is good for relating to real world but students will if they want to, but they all want to pass.
- k. I believe that the parametric method of teaching in Mech 420 was valuable to my experience as an engineer. It forced me to do every problem from the ground up throughout the entire course and nail in the basics with a hammer while doing so. Although I did find time not being favorable as ensuring each step is carefully completed made me work much slower than I would otherwise. In the workplace this generally would not be an issue however, so I believe it is a good approach in real applications.
- l. Although the MECH420 course has advanced my knowledge of heat transfer, the syllabus focuses largely on special cases as we get into more and more complex topics which is understandable since we do not have infinite. However, solutions to engineering problems are not as simple as the cases we study in class, therefore I believe there also needs to be an emphasis on showing students how to model real life engineering problems besides providing them with a general roadmap that can be applied in the real world. If we are not able to model the problems correctly, we will not find the right solutions.

2. What suggestion would you provide to future students to enhance their understanding and performance within ME-322/420 Fluid Mechanics/Heat Transfer?

- a. Believe in your knowledge and always complete all the questions to the best of your abilities even when it feels like you do not know the answers because you may end up learning more from your mistakes.
- b. When taking this course, you need to do the practice problems. The best solution to understanding is practice. This course is no different than a sport, repetition can allow you to understand complex problems using the path laid out for you.
- c. Plan out time to work on exams, quizzes, and homework. The workload for this class will probably more than anything that you have had at Kettering, so it is important to work in chunks. Also, use the notes to get the equations you need that make sense conceptually.
- d. For any new students coming into Fluid Mechanics or Heat Transfer I would recommend coming in with an open-mind and ready to be challenged, but in a good way. That was one thing I did not do very well; I came into these courses with a very closed-mind and did not want to accept the opportunities and challenges that these courses offered to me. It was not until around third or fourth week when I changed my mind-set. From that point on, my understanding of what the challenges demanded from me only improved. I would also recommend that they listen to the Professor, stay on top on their studying and practice problems, and be sure to "Follow the Roadmap".
- e. Prepare to study the slides for hours and do as many practice problems as you can find, because no two are the same.
- f. No matter the words you say to a student, they truly wont grasp what you mean until you go through the class with the professor. I really don't think that anything could have been said to me that would have changed the outcome, its truly an experience that you just have to endure.
- g. I would say do as many example problems as possible. The more experience you have applying the same concept/tool set to different scenarios, the more prepared you will be to handle a situation you haven't seen before on an exam and be able to solve it.
- h. Actually, look at the book. The books for both these classes are actually well done and you can learn a lot just from reading through them.
- i. Taking fluids and heat transfer as corequisites is very difficult, so paying attention is imperative. Focus especially on Reynolds numbers as they are a pretty fundamental concept in both classes and translates between the two a lot.

- j. Go through problems more slowly and thoroughly.
  
- k. Units checking made me stumble at first, but once you get the hang of it, its powerful. Also,  $W/(m-k)$  is the same as  $W/(m*k)$ . The minus sign in some of the material made me think it was subtraction in the denominator and confused me early on. Listen well at the beginning of the course, take plenty of notes, and have tables ready, be ready to interpolate values. This can save time.
  
- l. I would suggest students to refer to the book since it is not possible to cover each and every case study or nuance of the subject matter in class and there will be times when the professor will ask you to solve problems that may not have been directly addressed in class but can be solved through critical thinking and self-study.

3. What advice would you provide to MECH-322/420 Fluid/Heat Transfer students in Dr. Berry's class to enhance their success and performance?

- a. Start your assignments early as they are designed to take hours on end to complete. If any assignments are procrastinated, you will most likely not get it done and that will cause a lot of stress in the futile attempt to do so. It is hard to grasp the material right away so make sure to do some work outside of the class period. Work through problems yourself because they will be shown in class however, they are pre-solved which makes it hard to follow when it is a brand-new problem. If Dr Berry offers any help sessions, then attend them as they may give useful insight into how the problems should be solved.
- b. Follow the path, follow the path, follow the path. Dr. Berry will not steer you wrong. He provides you with all the tools you need to complete this course, you just need to trust his process and use the tools provided to apply them to engineering problems.
- c. Use the notes when working on anything. Chegg or other study resources will not help for anything. Also, explain conceptually what you are trying to do on a problem because sometimes the math can be overwhelming.
- d. My advice from above does not change much, however, I would recommend asking all the questions you can to Dr. Berry. Also, when studying and completing all the practice problems from the book, when trying to solve a problem either on an exam or a practice problem, look at what individual aspects of what are being asked, not the question itself.
- e. It is best to know the definitions off the top of your head, otherwise they take up a large portion of your test taking time.
- f. There is a hidden meaning to all of his slides, it is something that you WILL NOT understand until 6-7<sup>th</sup> week and only then will you become successful in his course. I saw week after week the comments from other students and not until later in the term did I know what they mean. It is not something that a student not through many weeks of Dr. Berry's course will understand.
- g. I would tell them to review the lectures on your own time, and only use those to study. The only work that will be correct in his classes are ones that follow his paths, not ones you might learn from online supplemental lectures or lectures from other schools.
- h. I would tell students to put in as much time as they can spare into the class. The problems are very difficult and long but if you are able to put long hours into solving them you can usually figure out the 'path' and come to a solution.

- i. Simply put, grind. This is easily the hardest and most confusing class I have ever taken, but also the most rewarding. "Follow the path" will haunt your nightmares for the term, but seriously, just follow the path. The numbers don't matter. Understand that in a given situation, you take an equation, do this to it. Then do that. Then find whatever number on a graph, then plug that in. Then do some algebra to solve for the final equation. Understand the roadmap and the numbers and math will work itself out.
- j. Find your own explanation of the path if the one provided does not work
- k. You **MUST** attend lectures; you **MUST** practice the problems more than you have in previous classes. The problems are not difficult when following the roadmap, but they can be time consuming even when you know what you are doing. If you have not practiced enough, you will run out of time.
- l. I would suggest students undertaking Dr. Berry's class to follow the notes and make sure you understand them. However, in order to gain a deeper understanding of the subject matter it is essential to read the qualitative analysis provided in the book. I would also suggest student to help Dr. Berry update his notes in order to continually improve the quality of the notes for future students.

4. Considering that you passed the course, do you feel that your understanding of the subject material was enhanced and why?

- a. My understanding has been enhanced because I was forced to struggle through many of the problems without much external help. What I will say though is that this came at the cost of burning out towards the end as I would spend so much time to complete assignments while seeking perfection in my work. The assignments take hours on end whether you do good or bad on them led me to care less about the topic than when I started in the class.
- b. I do feel that my understanding of the course is enhanced. Dr. Berry makes sure to not show us how to solve problems using numbers and equations, but how to solve problems logically, and use the equations as tools to find a solution. Dr. Berry gave me a better understanding of heat transfer, and I can thank him for giving me the tools to apply to engineering problems in my future.
- c. Yes, I definitely feel like my understanding of heat transfer and any energy related class was enhanced because I was forced to learn the material conceptually in order to answer complex problems. Also, my skills in using excel/MATLAB to answer complex problems in a neat and organized way was increased greatly.
- d. After completion of this course, I truly believe that my understanding of the subject material has dramatically improved. I have noticed my progression through the course, in the beginning not doing very well on the quizzes and struggling through practice problems and in the end of the course I am able to decipher and solve even the most difficult questions.
- e. My understanding of the subject material was “enhanced” as I previously had no knowledge of heat transfer, but I definitely do not fully grasp the content of the course.
- f. I think that the way I look at the world has changed a bit. I feel that whenever this happens it means that the understanding of a course has made its deeper true impact on a student. I think that true real world understanding can come by watching a few in depth YouTube videos, but this course gave a really broad understanding of how to look at Heat transfer and where it can be found.
- g. I feel I am able to do problems more in depth on heat transfer and for different situations I have not learned in previous classes.
- h. Yes it was. From a conceptual level I always was curious about how temperature and weatherconditions effect how warm or cold you feel. This class let me conceptualize that much better.
- i. Easily, my knowledge was enhanced. It’s actually pretty neat to be given a situation like the toxic waste on the alien planet in the project and be able to calculate the temperatures and heat flux.



- j. Yes it was enhanced because I know more than I did before
- k. Yes my understanding of heat transfer is exponentially larger than before. Although I do not believe I performed that well on the exams, I knew next to nothing about heat transfer coming in and now with enough time I can certainly solve heat transfer problems if the need arises.
- l. I believe that my understanding of the subject matter was enhanced since it required a lot of practice in order to simply pass the course. I not only had to know the subject matter but was also required to know it well enough to solve complex problems as quickly as possible in order to do well on the exams. The quizzes and projects were always challenging and required me to look beyond the notes and develop my solution. This required me to think critically and thus enhanced my understanding of the subject matter.

5. What was the single most important skill set taught that will hopefully assist your career as a practicing engineer and why?

- a. Perseverance through extremely long tests and assignments. I will take this to my future place of employment to help me push through difficult tasks and work through problems without giving up when it becomes challenging. I also enjoyed creating parametric graphs for the project/quizzes because that was reminiscent of real-world design processes, and I will use that in my future career.
- b. This course has given me the ability to problem solve. Having the tools to solve is one thing, but following the path shows that no matter what problem presented, there is a clear and concise solution for all problems.
- c. The most important skill I learned in MECH-420 is using a roadmap to solve a problem. When a single problem can be pages of work, you need to have a solid foundation and plan to follow, or your solution will not turn out quite right. When Professor Berry says “follow the path” he means it because it is the best way to solve problems.
- d. The greatest aspect I gained from this course was the ability to identify exactly what needs to be solved in a problem and developing a high-level of understanding in order to solve the situation. Being an engineer does not mean I am going to be sitting at my desk solving simple math or engineering problems, as the world continues to develop it demands more from engineers. Engineers must continue to think outside of the box and become even more innovative than they ever have been. With all the experience I have gained in this class, I truly believe I will be able to perform to the best of my ability at my co-op and any future engineering/management job I may have.
- e. The most important thing I learned was how to learn material outside of the classroom. Due to it being an online course, concepts aren't always transferred as well as they otherwise could be, and I had to teach myself a lot to fill in the gaps.
- f. One skill that I can honestly say that I brought out of this course was the ability to defend the solutions that I came to and prove to others around me that I was either right in my work. This helps with creating validity within my work and make my engineering solutions within the workplace more credible.
- g. How to effectively show my co-workers who are not engineers that my math is correct, through validating my units and creating graphs.
- h. I got really familiar with equation editor. Also, graphing solutions over a range of variables is a very useful engineering tool for design and analysis.
- i. I learned how to grind harder than I ever have had to solve problems that initially seem unsolvable. This is imperative when doing engineering research and innovation.
- j. Learning how-to walk-through problems in an organized manner.
- k. Boundary Conditions in this was the class where I think I finally got a grasp of them.
- l. I believe the single most important skill to have as engineer is being able to think critically through a problem even when it seems enormous. Taking the problem step by step and

identifying the steps you will need to take prior to starting the problem. This will allow you to take bites out of the elephant until you are eventually complete. Checking your answers throughout each step and taking your time will ensure you come to the correct final result.

- k. The single most important skill set that I learned through this class was to follow sound reasoning before taking the next step and solving the problem. As an engineer it is essential that we not only understand the problem at hand but also whether we are taking the right path to solve the problem.