

# MECH-322 FLUID MECHANICS

## “Parametric Thinking”

- Yes I do think that MECH-322 has enhanced my skills and ability as a student. This is the one of the only classes where I was challenged to understand the material before I could solve a problem. Most other classes were plug & chug types of classes.
- This class has given me more of an understanding of how our lives are impacted day to day by simple fluid mechanics. I can understand the importance of learning fluid mechanics.
- I believe MECH-322 has enhanced my abilities as an engineer. Parametric thinking is a useful tool that allows the mind to make connections from one variable to multiple variables. The parametric thinking taught in this course will definitely stay with me to later courses and will allow me to think more-abstractly about problems.
- Absolutely. Fluids is not just water moving as I had thought coming into this class. Dr. Berry teaches us as engineers about how to tackle problems with a “Road Map”; how to approach things in the correct manner. This applies to engineering and life in all instances, not just Fluid problems in class.

# FLUIDS MECH-322 FALL 2018

## ANONYMOUS CLASS ASSESSMENT

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 conclusion, 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 20 years, the world will see a cure for Cancer, will reach out and will start to colonize other planetary worlds, will discover new materials that will forever change our understanding of physics, and will be able to see further back into the past than ever imagined and 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 to prepare students to solve problems that we can’t even imagine today, and to be able to develop tools based upon on 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” to find and to understand answers to unknown problems and questions. It will be these students and these institutions that will contribute to the long term survival and expansion of human kind.

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 Fluids Mechanics and parametric design 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.
2. What suggestion would you provide to future students to enhance their understanding and performance within ME-322 Fluid Mechanics?



## ENGINEERING DESIGN & PARAMETRIC THINKING

1. Yes I believe so. The exam and quizzes in this class were not always straight forward; they required a lot of thinking and solving problems. This enhanced my skills.
2. I do believe that the knowledge of fluid mechanics has indeed enhanced my abilities, but parametric designs is a fairly common technique that I have been using since coming to Kettering.
3. Fluids has enhanced my knowledge as an engineer. It has allowed me to think outside the box and to apply the theories I have learned to my other subjects.
4. I feel like this information might or might not help me in the future. It depends on the job, basic problem solving skills will be transferable though.
5. MECH-322 has absolutely enhanced my skills and problem solving ability as a student, and future engineering professional. Fluids under Dr. Berry's instruction has completely altered the way I view a problem. A greater emphasis has been placed on the process methodology, rather than only trying to get a solution.
6. This class has given me more of an understanding of how our lives are impacted day to day by simple fluid mechanics. I can understand the importance of learning fluid mechanics.
7. I do think this class has helped enhance me as a student and has helped develop me into a more into a more independent thinker.
8. Yes, I think this course has enhanced my skills as an engineer because I have a better understanding of how fluids work in real life.
9. It has taught me that focusing on the process and the steps we need to take are more important than the "right" answer. The "how" and "why" are the key.
10. Yes. This has enhanced my skills & ability because you need to look at the problem as a whole and come up with a road map on how to get the variables you need to solve the problem.
11. I believe that it helps in the long run but understanding the material is on the trickier side.
12. I think MECH-322 HAS enhanced my skills in the field due to critical thinking and parametric equations it has made me achieve. No other class has yet done this and it was an honor to work w/Dr. Berry.
13. Yes it has. I learned that I work best in groups so I can discuss the steps to figure out complex problems.
14. Yes, I believe so. This class has greatly built my ability to problem solve and to understand that the right process will lead to understanding.
15. Yes above else the ability to think parametrically has fundamentally aided me in developing a way to consider future problems and topics.
16. I think this class was useful in the sense that we had to teach ourselves a lot of info. But that made us have a determination to get it done and get a good grade.
17. I strongly believed MECH-322 has enhanced my skills not just on a basic engineering standpoint, but throughout life. It has force me to analyze things more in depth and come up with a reasonable solution on my own.
18. I believe it has greatly improved those abilities and leading to road maps was a great help.

19. Yes this has helped me as an engineer. I would feel more confident doing a fluids related job.
20. No. This is more about analysis, than any design work.
21. Yes, understanding of what parameters are necessary for what equations is very helpful.
22. MECH-322 has shown me to think about where I'm at and where I'm going to solve a problem.
23. This class has taught me how relationships of fluids are affected in minor/major ways through changes in the system provided.

## FUTURE STUDENTS ADVICE

1. Do the homework! It takes a long time but is worth it in the end.
2. Do the homework, understand the notes, do the reading (if it doesn't make sense), and study for everything.
3. Practice makes perfect.
4. Some curve balls were difficult to figure out.
5. The biggest suggestion to future students would be to complete the homework as it is assigned. This cements the fundamental concepts of the material and provides the necessary practice to success in Fluids.
6. Sit up close because writing is difficult to see at time and practice becomes everything.
7. Do the homework problems and practice.
8. Go over the play book (notes) when studying. There are similar level of difficulty to test and quizzes.
9. Focus on the process.
10. KEEP UP ON HW.
11. Read the book, ask questions, and do the homework.
12. **Follow the Road Map! Do Homework based on the in-class not from internet.**
13. Understand what equations you need to get what you want to find, (ROAD MAP).
14. Pay attention and do the work and practice. With practice comes understanding.
15. Do the homework, and **FOLLOW THE ROADMAP.**
16. The study sessions helped a bunch and GO TO OFFICE HOURS!!!
17. **DO THE HW! The day I started doing the HW assignments was when I truly started grasping the concepts.**
18. Do the work, and find your road maps. Don't cram last minute.
19. Roadmap! Not about the work with Berry; it's the process.
20. Understand and focus on the road map and practice.
21. Identify the Road Map!

# FLUIDS MECH-322 SPRING 2018

## ANONYMOUS CLASS ASSESSMENT

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



## ENGINEERING DESIGN & PARAMETRIC THINKING

1. The projects provided in the class improved my communication and group work skills.
2. I believe that this class has enhanced my skills as a future engineering professional, in terms of teaching me how to solve fluid dynamic problems.
3. Overall yes. This class has helped me to not only understand Fluids, but to understand how you can use a parametric way of thinking to solve complicated problems.
4. **Yes I do think that MECH-322 has enhanced my skills and ability as a student. This is the one of the only classes where I was challenged to understand the material before I could solve a problem. Most other classes were plug & chug types of classes.**
5. Yes I believe it has. MECH-322 really taught me how to lay out everything I want and then figure out everything I need and then layout a road map on how to get there.
6. I believe this class does as the analytical skills and reasoning have brought many of my engineering concepts full circle.
7. Yes. It made me think of problems more unit based instead of number based.
8. They helped me think about problems as problems and not equations with numbers. They made me think about how the parameters will change the outcome.
9. I like the substitution of quizzes and exams as a design project. It makes you think of a problem in a multi-variable way unlike most classes and makes you see the importance of parametric design.
10. **I believe MECH-322 has enhanced my abilities as a student and an engineer. I agree with the methods that are used to teach this course. Learning the fundamentals of the laws and learning how to develop parametric equations gives you the ability to solve a wide variety of problems.**
11. Absolutely. The class was hard but has been fair and was taught well.
12. I think this has helped me visualize the process that occur with all fluids and their interpretations. Especially with the concept of head loss which was an important factor in aspects of my previous co-op. Fluid dynamics are everywhere, in all systems and you never know when you will never know when you will need that knowledge.
13. Yes it has. The professor has respectively talked about multiple ways to look at complete problems. You continue to encourage us not to give up and to keep trying.
14. Yes. When you design components. You will be facing problems which deals with fluids.
15. **I believe MECH-322 has enhanced my abilities as an engineer. Parametric thinking is a useful tool that allows the mind to make connections from one variable to multiple variables. The parametric thinking taught in this course will definitely stay with me to later courses and will allow me to think more-abstractly about problems.**
16. Yes. The projects helped achieve this.
17. The course has been set-up in a way that aids in the application of concepts to a variety of problems. It is not strictly a plug and chug course which is helpful.
18. Yes. Fluid Mechanics has helped me enhance my skills as a student, b/c learning to solve problems parametrically instead of plugging in numbers.; Is a great feat on its own.

19. I do believe it has advanced my skills through practice. I believe I could take a real world problem and solve it.
20. Yes. I believe fluid mechanics is pretty useful to me. It gives me a concept of applying knowledge into the real world.
21. Yes. I have definitely become more focused on the process of solving problems during this class.
22. Fluid Mechanics has taught me a lot. I have learned how to correctly think about problems and how to strategically solve them. This class has made me a better thinker.
23. It teaches me to use a different view to solve problems.
24. Yes. My knowledge of fluid mechanics has been enhanced.
25. Yes. It absolutely has helped me, especially since I like classes like thermos, fluids and heat transfer, as they are real world problems and I hope to get a job revolving around this.
26. This class has increased my depth of knowledge in the field, but like many other classes, still relies heavily on rehearsed material and book learning.
27. I believe MECH-322 greatly helped advance my knowledge and abilities which will carry with me because it made me realize how to strategically approach & solve problems.
28. Fluid Mechanics has made me understand that if you know the concept behind the topic you are better off than if you payed attention to numbers. It elevates your thinking. I think this course is perfect the way it is right now.
29. Yes. This class has than developed my current knowledge along with the ability to form technical questions regarding my curiosity for the realm of fluid mechanics.
30. Yes. MECH-322 has increased the need for critical thinking when approaching a problem.
31. I think MECH-322 has tremendously enhanced my skills and abilities as student and as an engineer. I am able to think of problems parametrically when as before that wasn't always the case.
32. I do believe that the parametric mindset has been developed better through this course.
33. Yes it enhanced my skills in analyzing mechanical engineering problems.
34. I believe I have left with greater knowledge of engineering that I can use in my future.
35. It has because have had to step things up in order to keep up in this class. This has helped my study skills tremendously.
36. It has enhanced my professional ability b/c of how it has made me think about problems.
37. Yes. Parametric Design is an important part of professional process and fluids in particular will help me in my career.
38. I definitely think this course helped me become a better problem solver in general. Although I started off pretty rough on exam one, I believe I have developed the skills necessary to be successful a critical thinker.
39. Throughout the course the application of the problems in a design sense allowed for the real world application to be seen and analyzed.
40. I think this course & the parametric equations were helpful but the design projects seemed a bit outside the scope of the class. However, solving things in terms of the parametric eqn. will help me.



41. **Yes, even though this class was very difficult because it's structured in a way that I have not been taught before, this class showed a standard way to handle any problem.**
42. Yes, the Professor's emphasis on parametric design and greatly increased my skills and abilities as a future engineer.
43. Yes it has. Before this class I was never challenged to think parametrically, so I am grateful I have been taught that. This class has been fantastic. I suggest no further improvements.
44. **Fluids is a challenging class that requires us to think as engineers and apply our knowledge in new ways.**
45. **Yes, I believe this course has taught me valuable skills that will assist really in my engineering course and have developed me as a student.**
46. I feel Fluid Mechanics is a fundamental course for understanding how the world works. Therefore having knowledge on the subject is critical to my success as an engineer.

## FUTURE STUDENTS ADVICE

1. Learn the material as it comes, don't wait for exams to come around.
2. Look at the big picture for every problem and consider what the best way to proceed is. Do not just make snap assumptions or judgements that could be wrong.
3. The key to being successful in this class is by far to do and understand the example and HW problems.
4. Pay attention and write out the needs/haves of the problems and then look at big picture and how to get where you want to be.
5. Speak more with heat transfer professors to clear up cross concepts better.
6. Pay attention units.
7. Ask questions, double check your work (i.e. write out equations and make sure you understand how parts affect your answer.)
8. YOUTUBE each topic and find real-world applications.
9. I would suggest learning about why the equations used in the class work and when they are applicable.
10. Pay attention, do practice problems and practice, practice, practice.
11. Do your homework. Learn the fundamentals or you will struggle.
12. Do the Homework. Especially for the harder concepts. Just seeing the examples improves your understanding.
13. Do some of the HW on a regular basis and studying for the exam won't be nearly as hard.
14. Work as many problems as possible.
15. Consistent linking back to "real world" examples of applications of concepts is always helpful when trying to wrap your head around new ideas.
16. My advice is to do a lot of practice problems and review notes.
17. I believe if we could spend more time on Chapter 8, it will be better. Chapter 8 is pretty hard.
18. The most important keys to success in the class is going to class and doing the suggested homework multiple times as suggested.
19. Do homework.
20. Take good notes; pictures are worth a 1000 words.
21. The broad subjects of this class require practice in order to fully understand the concepts.
22. Learn the road maps.
23. If the syllabus, book, and suggested problems were given when registering for the course, I would dive into the material over work term to get a head start.
24. All questions are good questions. Better understanding means easier to work through and solve new problems.
25. Practice makes perfect. Do the homework and seek help if need be.
26. One suggestion I have is to provide a smaller set of of HW questions (more focused) so more students do them.
27. Do the homework. Pay attention. Think it through step by step.

28. STUDY.
29. Stay in-front of things. It pays off down the road.
30. Fewer homework problems, there were too many to complete each week.
31. Study concepts and know prerequisites.
32. It's obvious, but do the homework. I slacked off in the beginning which is why I did so bad.
33. Don't rely just on lecture notes; Google the topic or better yet, purchase a book.
34. Don't take in a 24 credit term.
35. Work problems in reversed order to help establish a better road map you can understand.
36. Do homework AND rework example problems.
37. Make sure to allow the proper amount of time to success in the class and do all the HW.
38. Perhaps taking more time on the Laminar/Turbulent flow subjects.
- 39. To future students I would say to stay ahead on the homework & understand the ideas and concepts before each and every quiz or test.**

## **FLUIDS MECH-322 WINTER 2018**

### **ANONYMOUS CLASS ASSESSMENT**

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! 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 what is known is that a hallmark of the independent mind is a problem solving mentality; i.e. having the ability to self-learn, having the ability to extrapolate data and to form conclusion, 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.

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## FLUIDS MECH-322 WINTER 2018

1. I believe it has. You challenged us to use the skills and abilities that you gave use (as well as ones we had) to take on problems that we didn't know. This will help greatly. Thank you.
2. MECH-322 has opened my eyes to how difference to fluids and solid mechanics. On the surface, the mechanics of fluids seems more complicated than it actually is. With just a small number of equations, you can solve a wide variety of problems. I think that is life, I over complicate thinks a lot. These concepts I can hopefully apply to my life now.
3. I think all engineering courses should have the same basic fundamental this course taught me; to design road maps. These roadmaps allow for easy following of the mentality used. Rather than focus on numbers, it is important to understand the basic concepts each 11th weeks course is taught.
4. YES! Many ME courses are very similar. Fluids takes the same concepts and applies them to a fluid matter, which is difficult to grasp. This class forces us to think before working.
5. I think MECH-322 has enhanced my skills as a student because I know the concepts behind fluid mechanics. I now have a basis to stand on when working with these types of problems.
6. MECH-322 has improved my skills. I work with fans and have built a wind tunnel for testing the fans. This course has given me knowledge to better understand the technical documents associated with testing and the industry.
7. As a student, Fluid Mechanics has taught me the importance of due diligence. I became somewhat complacent after the midterm and did not, in hindsight, adequately prepare myself for the rest of the course. While this is certainly not only lesson I have learned from Fluids, it is a very valuable lesson as an engineer.
8. Yes I do. Fluid Mechanics seems to be one of the key building blocks for engineering applications. Learning and knowing how these concepts are applied to these new challenging problems is the main take away from this course.
9. I think it has enhanced my problem solving skills. At the beginning I wasn't able to think like an engineer. After I took this course, I feel that at least I can read through problem and think what equation or theory should apply.
10. MECH-322 only has enforced in me that understanding an equation is meaningless if it can't be applied properly or if the use fails to understand what it means.
11. Well it has certainly helped me understand the physics behind coolant flow in CNC machines.
12. I think the enhancement of skills comes solely from being challenged. This course did challenge me.
13. Yes, combining Dynamics and fluids has helped me better understand the world around me.
14. I would say that Fluid Mechanics has enhanced my skills as a student. In has taught me important physical relationships that go beyond just this class. I hope to take my lesson learned both good and bad and apply them into my life.
15. Absolutely. Fluids is not just water moving as I had thought coming into this class. Dr. Berry teaches us as engineers about how to tackle problems with a "Road Map"; how to approach things in the correct manner. This applies to engineering and life in all instances, not just Fluid problems in class.
16. I think it improved my discipline in the whole process of engineering, it also made me realize I can't have a part-time job during class terms as I risk falling behind.
17. Yes. It showed me just how many problems that seem impossible to know an answer to, are solvable with pencil and paper, increased than any previous engineering class have taken.

18. It believe it has enhanced my critical thinking skills as a student and engineer, I say this because it has pushed the fundamentals of the class to help me solve some of the most difficult problems in the class (test and Quizzes).
19. I do believe that MECH-322 has enhanced my skills and ability as a future engineer, It has forced me into thinking about things in a different way than I normally do, and has opened my eyes to thinks that were neglected in previous courses.
20. MECH-322 has enhanced my skills and abilities because I was taught how to deal with fluids around an object in order to determine things such as pressure, force, velocity, etc. I will be able to use this information while designing thinks such as cars, planes, boats, windmills, etc.
21. Fluids has definitely helped me because I plan to work with internal combustion engines and learning about pressure, flow and losses will definitely help. Thanks Professor Berry.
22. I believe it has, since the difficulty of the course has caused me to have to think about to solve a specific problem for myself, and learning from those struggles helped solidify my own understanding and ability to apply the concepts in the real world.
23. I am better able to look at what tools and variables are available to me, and to seek out independently what I need. Problems that are currently unsolvable van be expressed in a way to see relationships.
24. I would say yes, it has definitely pushed me to think outside the box.
25. Yes. Never enough tools in the tool box. Makes you think outside the box.
26. This class builds of my of many classes before it, as well as, I imagine supplies fundamentals for classes to come. I think ultimately it helps refine problem solving skills as well as pushed me to “think outside the box”. I don’t think I’ve used “assumptions” more in any other class, which isn’t all bad. I feel it stems from attempting to really understand a system.
27. I definitely feel this MECH-322 course has increased my abilities to solve problems with an engineering mindset. I learned how to think of relationships that I understand when approaching a situation where all variables seem to be unknown. This course has prepared me for future classes and career challenges by becoming more analytical and to not just write down meaningless numbers.
28. Every course is an opportunity to enhance my skills and abilities. Application of oneself in the class is how you grow those skills. Fluids mechanics is a difficult course with lots of permutations of problems. In seeing a problem and finding a road map to the solution, you enhance your ability to think critically; even if you lack the ability to actually solve the problem. Mech-322 has turned my focus from solutions to roadmaps possibly to a greater degree than other courses. But if that is the goal I would suggest greater emphasis on what components and experimenting with open-end quizzes and exams.
29. I feel that Fluids class has enhanced my ability to look at the problems posed to me and see more than just numbers. I have had to rely less on equations memorization and more on understanding the concepts behind them.
30. I think any basic development of dynamics of fluids can solve energy problems, i.e. wind turbine. This class can be the foundation to more technical solutions.
31. This taught me a lot about fluid statics and dynamics and about myself. I found myself completing questions fairly fast and was understanding the material quite well. I enjoyed the class and may decide to go into a field that deals more with fluids because of it.
32. Yes. Lots of things use fluids. So in the future I will most likely need fluids as an engineer.
33. While I’m not planning on working in an area that require fluids, this class and its contents more taught me more problem solving methods which is always useful in engineering in general.