

Example Responses

The following pages contain example responses from ECE 419 students. Three sets of responses are presented:

- Student 1: High**
- Student 2: Average**
- Student 3: Low**

Student 1: High

1. While trying to solve an engineering problem, evaluate a process, or gather a new set of experimental data, give a brief description of steps that are required to achieve these goals. (i.e. describe steps in experiment design, data collection, data analysis, etc).

ANS: In the context of an experimental design this would be my process:

- (a) Clear identification of objective(s): It should be very clear to all involved as to what the design is supposed to achieve.
- (b) Precedent – do research to see what has been done before. We do not want to reinvent the wheel. Besides it is beneficial to see what other solutions have been tried before as this could save us time and anguish.
- (c) Formal statement of design/task parameters – this is somewhat a reiteration of (a) but with exact specifications. After the exact specs are known we must evaluate whether or not our design can be achieved. We should also take into account the extreme situations that our design may encounter. For instance, things built and tested at room temperature must often operate at much higher temperatures.
- (d) Contingency plans – we must have a plan of action in case all or some part of our design does not work as expected.
- (e) Testing/Certification – all designs must be tested and certified. This is becoming more important as can be witnessed by more stringent ISO standards. In order to meet these standards we must have adequate testing methods and test equipment. After all the certification of our design can only be as good as our development tools and test measurements.
- (f) Proper documentation – as any designer knows this is an absolute must. This includes reports, test data, design philosophy, problems, potential future projects

Student 1: High

based on the design, etc. If the design is software oriented, this would translate to heavy commenting within the code.

2. Discuss the impact of engineering solutions (to problems or market needs) - especially electrical & computer engineering types of solutions - in both global and societal contexts.

Global

- Today's world is all about engineering solutions. Any country without modern technology is considered third world. In an EE context examples would be basic telephone services or basic electricity.
- Imagine what chaos there would be at international airports without modern technology such as radar tracking, weather tracking, and effective communications.
- The Internet has had a tremendous impact on the world. News travels in an instant and government regimes are overthrown through unification of the masses by way of Facebook (recall Israel?)
- Stock trading is now done with computers and the machines do it better and faster than humans.
- Electrical/computer inventions that have had a huge global impact are the GPS, modern communications technology, modern radar, and a crossover into the realm of modern medicine (nanotechnology).
- Engineering advances the world!

Societal

- The modern household and workplace are full of engineering solutions. We would be helpless without them.
- Inventions with a huge societal impact are the computer, cell phone, IC chip, Internet
- Engineering advances society

Student 1: High

3. Many engineering teams are geographically diverse and much communication relies upon videoconferences, teleconferences, and email. (i.e., a design team for a single project may be split between 3 distant locations) Discuss the advantages and disadvantages of engineering teamwork in such a geographically diverse situation.

Disadvantages:

- Do not have quick access to team members (not as easy as walking into someone's office). Modern technology however has reduced this.
- Possible language barrier,
- Eavesdropping potential. We must realize that everyone spies on everyone these days and any Internet communications are vulnerable.
- Ineffectiveness –people can choose to not use their communications devices and in effect sever team communication. Another example of ineffectiveness is how today's computer teams are divided between local development and sales while support is farmed out to another country. Talk to anyone who has been stuck for hours on the customer support line to India.

Advantages:

- The customer base for our product could be in other country so it would be advantageous to have local representation in that country
 - Expedition of services or materials. If for example *if* we are assembling and testing a product in the US and the parts are made in France, it may be prudent to move the whole operation to France.
 - Cultural barriers – other team members may relate to the locals better. For example a car with an American body design may not be appealing to the average European and our foreign contact could give us better insight on this matter.
4. Based on the all previous classes you have taken at UNM, describe what you learned about the engineering tools that are currently available to engineers? (Including software, hardware, techniques, etc. Take as much space as you need).

Software:

Student 1: High

- LabVIEW – perhaps the most powerful of the programs I have learned here at UNM. Because of my previous work experience I had a good understanding of the importance of this software. VI's are the wave of the future and this software should figure prominently.
- PSPICE - an invaluable tool for circuit analysis and design. Again I had used this before but I learned more about its capabilities here at UNM. Specifically I learned a lot about FET and BJT design.
- MultiSim – an excellent circuit simulation tool. I learned how to construct and test some basic DC and AC circuits. I learned much about the measuring capability of the program
- C, C++ - I had never written any code before with this language so I gained a tremendous amount of knowledge. Specifically I learned the importance of pointers. My main disappointment is that I haven't done much with it since I took the class. This has led to my frustration as you will read about next
- Matlab – perhaps the most useful of the programs. If the department considers this is so important to know (which I agree with) why it is not taught instead of C or C++. I have been given many Matlab assignments that I have struggled with vs. no assignments with C++. In fact I was almost not allowed to take Linear Algebra because I had not formally taken a Matlab course. However I continue to learn more about this program and I may chose a Matlab oriented project for Senior Design.
- VHDL – basically learned nothing because the class was poorly taught. It was stressed to me how important this software was and again I must ask: if it is so important that why is it not better taught? The texts were also disappointing. ^{then}

Hardware:

MOSFET, BJT – here I learned much about the amplification capabilities of both devices. Most important to me were the comparisons of the advantages and disadvantages of the two devices. For instance the voltage-controlled properties of the MOSFET make it an ideal choice for a low power application. In fact for our Electronics II group project, I proposed a MOSFET design which in fact had the lowest power consumption of all the groups while meeting all of the other ~~design~~ *required* design parameters (frequency was extra credit).

Student 2: Average

1. While trying to solve an engineering problem, evaluate a process, or gather a new set of experimental data, give a brief description of steps that are required to achieve these goals. (i.e. describe steps in experiment design, data collection, data analysis, etc).

The first step is to identify and define clearly what the problem is. Its always a better idea to write things out on paper to make sure you have all the facts right. The second step is the brainstorming process. You should write down any ideas that occur to you, while being creative and imaginative to get as many ideas as possible. The third step is to select a possible solution that you think could best solve your problem. Its best to way out the pros and cons of your solution to try and decide if you have the best solution to try first. The fourth step is to decide on your plan of action. How you will go about solving your problem, the time frame, and communicating with your team members if you have any. Then start working on your problem. The fifth step is to review your solutions and your experiment. Collect your data and see if your solution solved the problem. In the worst case scenario and your problem is not solved then start back at step two.

2. Discuss the impact of engineering solutions (to problems or market needs) - especially electrical & computer engineering types of solutions - in both global and societal contexts.

The impact of engineering solutions to problems or market needs have been substantial in changing our way of everyday life. Electrical and computer engineering have changed the way people live, communicate, interact with the world and with each other. They have changed the way business are run and how security is measured. Now days computers are in everything we touch. They run our society and shape it. Every time it seems a new problem arises the solution is found in engineering and newer technology. In my opinion the

Student 2: Average

advancement in technology is making our world better, less complicated, and easier to manage. And this pertains to global needs as well.

3. Many engineering teams are geographically diverse and much communication relies upon videoconferences, teleconferences, and email. (i.e., a design team for a single project may be split between 3 distant locations) Discuss the advantages and disadvantages of engineering teamwork in such a geographically diverse situation.

If you have teams split up across the country it can be a good thing because different areas will have different resources to use to their advantage. If a problem comes up in one group, you don't have to worry about the same thing happening in another group. Such as if a virus infected computers, the other groups would not be infected. And just having a diverse group from different backgrounds and different areas can create good and different ideas and a creative way to solving a problem can be worked on. Another advantage is everything is saved electronically. Using emails you can more easily keep track of conversations and go back and look at what was said. Documents can be saved easier, and you can create backups to your work since it is already in an electronic form. Some disadvantages to working in a geographically diverse situation is that it is always easier to communicate with the people you are working with in a face to face scenario. Ideas can be more easily expressed and if questions come around its always easier to just get up and ask the person right in front of you. Using emails, video, and teleconferences can be cumbersome sometimes, and if the software or network isn't working at a certain moment you have to wait for a response. And as always using electronics to do all communication problems always arise at some point, and you have to be able or hire a person who can come in and fix the problem, be it with the network or the hardware you are using.

4. Based on the all previous classes you have taken at UNM, describe what you learned about the engineering tools are currently available to engineers? (Including software, hardware, techniques, etc. Take as much space as you need).

Throughout my time here I have come to learn and work with many types of engineering tools. I have worked with programming languages such as C and C++. I took a lab that required me to learn LabView, and another lab I worked with VHDL. I have used and worked with Putty, which is a linux based environment. I have gotten to work with some circuit boards and build electrical circuits. In one class the instructor made us use Java, and so to pass the class I had to teach myself Java. Through a microprocessor class I learned machine language and working in the lab I now know how to work with machines. I have learned how to design and draw out circuits. I feel that most of the education I have received about engineering and the tools they use I had to teach myself, and there for my knowledge and understanding in these tools are lacking.

Student 3: Low

1. While trying to solve an engineering problem, evaluate a process, or gather a new set of experimental data, give a brief description of steps that are required to achieve these goals. (i.e. describe steps in experiment design, data collection, data analysis, etc).

The first step I would take is write out all the equation and solve them for their answers. Then next I would start to have a discussion on different process that can be used to solve this problem. Then I would run an anlysis on the process to gather new data on it and start to do some research on on it to obtain more data.

2. Discuss the impact of engineering solutions (to problems or market needs) - especially electrical & computer engineering types of solutions - in both global and societal contexts.

The solution that engineers give play a critical role in development and evolution of our society, and culture. There are several different types of engineering problems, that may affected several people by the solution. Engineering solutions have the ability to find and fill the needs of a certin market but, also the engineered products can create their own market. The engineering side that affects the societal side is on a much larger scale. The more important design that affected the societal was satellites, and satellite communication and our ability to send and receive information from around the world instantly.

3. Many engineering teams are geographically diverse and much communication relies upon videoconferences, teleconferences, and email. (i.e., a design team for a single project may be split between 3 distant locations) Discuss the advantages and disadvantages of engineering teamwork in such a geographically diverse situation.

In an engineering team is composed of people around the world or the country that give the team a number of different benefits. This gives the people in the team the ability to see different solutions to the problem and go with the most practical one. This is the most important thing to the engineering team because it will give them to come up with unique solutions to the problem. Know thing that are not useful to the team that since it can be made up of people from around the world and other countrys the time differecns is a big factor. Also, having to work though email phone calls and skype are very difficult.

4. Based on the all previous classes you have taken at UNM, describe what you learned about the engineering tools are currently available to engineers? (Including software, hardware, techniques, etc. Take as much space as you need).

The electrical engineering program at unm has many great aspect of the program that give you a basic understanding of the electrical engineering field has to offer. Also, learned a verities of different progamms such like Matlab, Labview, T-Spice, simullinxs, and vhdl.