Some advice on writing the essay for our program

Thank you for looking at this document. You are already one step closer to a superior application essay because you are putting in a little more effort than a student who does not. Below we discuss the major mistakes students make and give you some examples of bad and good responses to our questions.

Common mistakes:

1. Not following directions

Although it may seem arbitrary for us to reject your essay because you do not follow the formatting instructions, we have two major reasons for asking for a particular format. The instructions state:

   The essay has three parts that should be treated separately; label each of the three parts with the number and header below

We want you to use this format because it easier for us. The best way to evaluate applications is to score all of the answers to one question first, then the second question and then finally the third. If we have a hundred essays to read and compare, and we have to search through them to find the answers, well, we get grumpy and are less likely to give your answer the attention it fully deserves. We are only human.

Research requires careful, considered work. If you cannot follow instructions, how good is your attention to detail in your research project going to be? Demonstrate to us with your application that you will take the time to work through problems and get it right.

2. Using the essay prompts from other REU programs

Our questions are not that different from those asked of other REU programs, so it may be tempting to paste in your essay for another program. This will save you time, but it does not impress us. We ask our own questions for a reason, so please answer them.

3. Not paying attention to writing style and grammar

We debated what to call our questions and ended up sticking with "essay" because we are looking for your ability to write well. Not writing well will not automatically exclude you from the program, but sloppy work (for example, misspellings), does not help. Write your answers and let them sit for a day or two before rereading them and deciding if they convey your thoughts clearly. Better yet, get someone to read your answers and critique them. Read your writing out loud to hear if your writing makes sense.

Some examples

Question 1. The first prompt is about why you want to participate in research this summer. We give you some example questions to answer. You do not have to answer any of the questions, but they might help you figure out what to write. Consider this answer:

   I have loved the outdoors from early childhood. From this love sprouted an interest in ecology. I have continued to build on this interest at My University where I have done a small research project. I haven’t been able to fully dedicate myself to my research project. The University of Kansas is well known for its sciences and is truly an impressive institution to partner with which is why an REU at KU is a perfect opportunity for me because I now will be able to fully dedicate myself to a research project and learn the principles and practices that will prepare me for graduate school that I currently do not have the opportunity to gain. After graduating I plan to attend graduate school to study ecology. Once I have completed my masters, I would like to
pursue a doctorate to specialize in community ecology or species interactions. In the end after I have completed school I would like to work as an ecological researcher.

The writing is slightly awkward (notice a run-on sentence). Much of the writing is colloquial and has a general lack of formality (formal writing does not use contractions—though that is admittedly being quite picky).

At first glance the answer seems to address several of the questions that we asked, but thinking about the answer more deeply, it is really a series of ideas strung together without much connection. For example:

1. A love of the outdoors led to ecology but a love of the outdoors could just as easily lead to being a white-water rafting guide. What is it that brought this student to ecology? Why does a love of the outdoors matter for doing research this summer?
2. The student reflects that he/she does not have the ability to do a full-scale research project at his/her home institution. That is an important consideration for the REU program. However, what are the skills that the student wants to gain? This is very vague, but the student connects this to preparation for graduate school. What exactly can the program offer that would help the student?
3. The question is about why the student should participate in the program this summer. Is there anything to give a hint about why this summer is better than any other summer? How does this fit with the student’s undergraduate plans?
4. The student flatters us. Thanks, but we are more interested in you and why you think we can help you. How will you take advantage of this opportunity?
5. Did the student follow the formatting guidelines?

Consider this response

1. Why I want to participate in research this summer
   My career goal is to work in ecology research. I find ecology fascinating because it is the study of the relationship between organisms and their physical environment. As we are changing environments, being able to predict the effects on ecosystems is fundamental to preserving ecological interactions. At My University, I am conducting a small research project on the effect of nutrients on the growth of a plant to test the hypothesis that growth is dependent upon the amount of fertilizer added. Although I enjoy this project, between classes and working full time, I do not have much time to explore the question more fully. I would like to participate in the REU program at The University of Kansas to have time to focus on a research project. Participating this summer, between my sophomore and junior years, is ideal because I will be able to explore ecology and receive advice on the courses in my last two years that will best prepare me for graduate study. I am particularly interested in improving my skills in data analysis and reading the primary literature, both of which are an essential part of a research project.

This response conveys much more information about the intent of the student in participating in the program. The answer explains why ecology is relevant to the student beyond a vague “interest.”

Question 2. The second prompt is about why you want to participate in research this summer. Why do we ask this? The National Science Foundation is actively working to increase the diversity of people participating in science. We are looking for all types of people. A variety of research interests (as relevant to our program), ethnicities, socio-economic backgrounds, undergraduate institutions, life experiences, personal challenges and talents, among other things, all add to the experiences of the participants.

I am a first-generation college student on my father’s side. We are from rural Iowa and I have always wanted to be a woman in STEM. This type of research goes far outside the typical laboratory procedures My University can provide. However, I am a biology and psychology major with an emphasis in statistics. This is a way to help with the
math and computer science aspects differently than if I was not always thinking objectively with the training a biology degree cultivates. I think most individuals can contribute differently, but I am dedicated and passionate beyond the realm My University’s ability to provide. I think I can bring a unique perspective to an already original platform that ecology provides. Similarly to a math or computer science major I have experience working with computer programs such as Microsoft Excel, P.A.S.T, basic functions of R, etc. I also have an extensive background in outdoor activities such as backpacking. These experiences have given me the capabilities to spend long hours outdoors and enjoy it which is a benefit when conducting field research in the hot Kansas summers.

The good part of this answer is that it provides some concrete skills that can contribute to the research. What is less clear is how this might contribute to the program. Some of the personal background comes out from this information that may indicate that the student may not be similar to some other students, but the writing is again awkward and difficult to follow (and what is P.A.S.T. anyway?). The formatting is missing as well.

Consider:

2. What I can contribute to the program.
My interest in science developed while growing up in rural Iowa, where I could witness the effect of land management on the growth of crops. As a first-generation college student, I have not always known how to follow my science interests but I enrolled at My College to major in biology and psychology so that I can pursue a STEM degree. I have added an emphasis in statistics to increase my skill set in data analysis, thus I have experience with computer programs such as Microsoft Excel and R. These skills may help my ability to analyze data that result from my project. In addition, I have extensive backpacking experience that that I have the ability to spend long hours outdoors, which will be beneficial for conducting field research in the hot Kansas summers. I hope to also expose other students to the joys of a Plains state summer and get them outside to camp as we explore the unique environment of Kansas.

This answer is less clunky in that it integrates many underlying ideas in sentences. The unique qualities of the student are highlighted as well as an idea of what the student might contribute to the experiences of the other program members (do not worry, we are not going to make you go camping if you do not wish to!).

Question 3. The last question is about why you chose particular projects. This is the most important question in the whole essay because it is through this answer that you demonstrate that you have thought about the research project.

These paragraphs are essential for demonstrating your potential engagement with the research. Each mentor will take one student, so you are in competition with the other students that chose the same mentors for those positions. A vague answer about a project being “interesting” is not going to convey the same enthusiasm for the subject as an answer that is specific about how the project fits with your goals.

Please keep in mind that if you only choose one project, and it is the most popular project, you have a smaller chance of getting into the program. Of course, if the one project you choose is the ONLY project you would be happy conducting for ten weeks, then only list that one project.

Consider this project description (this one is not available this summer):

Dr. Leo Smith, Fish Systematics
*Background paper.* The Smith lab explores the history and diversification of fishes. We use a combination of phylogenetic trees, field collections, and focused anatomical, morphometric, and genomic analyses to understand the evolution and diversification of freshwater or
marine fishes. Research in the lab is currently emphasizing deep-sea and bioluminescent species. The lab is currently working on both molecular and molecular approaches to studying the evolution of deep-sea fishes. REU students will help design their own project that matches their interests, examples could include: 1) evolution of body shape or discrete structures in a group of fishes (e.g., body shape variation in deep-sea hatchetfishes [Sternoptyctidae]); phylogenetic studies (e.g., relationships among dragonfishes [Stomiidae] or lanternfishes [Myctophidae]); comparative morphology of light organs or lures in bioluminescent fishes.

Here is a possible response:

3. Why I wish to work on the projects that I have chosen
1 Dr. Leo Smith, Fish Systematics
2 Dr. Deb Smith, Native Bee Ecology or Social Spider Biogeography
3 Dr. Jim Bever, Ecological and evolutionary feedbacks between plants and beneficial fungi
I chose these three projects because I want to work in a field setting and specifically with any animal species. For the first choice I find it interesting to observe different fish species and how different fish species evolved. I am interested in how different fish species have evolved different structures and have developed different body shapes to deal with the environment around them. For my second choice it would be interesting to see how bee species would react to different modifications to their natural habitat. This study would be interesting as it would help show how different species will react to the same type of stimulus. It would also be interesting to see how those that benefit off of the species are affected as well. For my final choice I find it interesting to work with different kinds of fungi to see how different types of plants are affected by them.

Good things about this response:
1. It is in the requested format in that it has a number and a title.
2. It discusses some aspects of the studies that would be of interest to the student

Less good things about this response:
1. The prompt specifically asks for a paragraph for each of the choices.
2. The introduction discusses working in a field setting. The fish project does not involve field work (we do not have much capacity for deep-sea field work in Kansas).
3. The use of "would" makes the whole paragraph awkward. Compare "It would be interesting to see how bee species would react to different modifications to their natural habitat." “I am interested in how bee species react to different modifications of their natural habitat.”
4. The introduction discusses working with animals and the third choice does not involve animals.
5. Although interests are expressed, none of them are about science. The discussion is more about the “interesting” aspects.

Another response for the same project (we will only focus on the first paragraph for the rest of this discussion):

3. Why I wish to work on the projects that I have chosen
I have always loved fish. Ever since I caught a fish as a child in the pond on my grandfather’s farm, I have been intrigued by the beauty and complexity of a fish. I spend that summer trying to catch all the different species in that pond and identified them using a book I got in the library. I haven’t worked on deep-sea fish, thus working on these fish would greatly expand my horizons with respect to the variety of fishes that exist on this planet.
We do not have much to say about this response. It reflects a passion for the organism, but is not informative about the science. We want to know about how the subject matter in a scientific field that intrigues you. We are also looking for some effort spend looking at the background paper. The paper is included for your reflection. We do not expect you to completely understand the paper, particularly if you are in your first year of college, but we do expect you to reflect on the science. We also give you a link to the mentor’s webpage (see the mentor page), which you can use to learn more about the research performed in the lab of interest.

For this particular project, the background paper is about the relationship between species-specific bioluminescence and diversification of deep-sea fishes. One major message of that paper is that fish groups with species-specific bioluminescence have more species than groups of fish with bioluminescence for camouflage. That is a fascinating finding because it means that the type of bioluminescence in a fish group is related to how the group evolves over time.

Consider the following:

3. Why I wish to work on the projects I have chosen

Dr. Leo Smith’s project on Fish Systematics is my first choice of project. I am interested in biodiversity because it is essential to life on earth. The Smith lab explores fish diversification. Understanding evolutionary history is a prerequisite to understanding the diversity of fish. How an organism adapts to its environment can provide hints about the diversification of a species group. Also, bioluminescence, when organisms emit light, has always been an interesting phenomenon to me. The study of the versatility of bioluminescence across differing species are unique research opportunities that I would enjoy. Additionally, this lab appealed to me because it utilizes molecular techniques for studying evolution. Through previous work in a molecular lab, I am familiar with basic lab techniques and protocols.

This essay reflects more of the science involved and how the student connects with the work. So far, this is the strongest response we have seen to the question.

A final paragraph to consider:

3. Why I wish to work on the projects I have chosen

My first-choice project is Dr. Leo Smith's fish systematics project. The diversification of animals is a field of study that interests me. The fishes are one of the most diverse vertebrate groups and deep-sea fish have a diverse array of bioluminescent strategies. Given that species-specific bioluminescence is associated with speciation, as demonstrated by Dr. Smith and colleagues in the background paper, I am particularly intrigued by the project on comparative morphology of light organs or lures in bioluminescent fish. I do not have any experience in studying morphology, but I understand that comparing morphology among different species is a key way to understand how new structures evolve. Through this project and working in Dr. Smith’s lab, I hope to gain an appreciation for the study of morphology that might be applied to any species group I study in the future.

This response is better because it puts in in an intellectual context for the student (where the student’s interests are) and recognizes how the scientific work will help to advance the student’s research goals. The student reflects on what is important about the work done by Dr. Smith.

These are not easy paragraphs to write, and we do not expect first year undergraduates to do as well as third year undergraduates. Do your best to explain to us what you hope to learn in doing the research and why you think this work will hold your interest for ten weeks. Be realistic. Do not choose a project that will challenge you personally (if you hate spiders, do not pick the spider project) but do pick a project that will challenge you intellectually (if you have never written a program but think that might be important for your future, that might be a good reason to pick a modeling project).
**Some final thoughts**

Note that two words are often overused by people writing about science: interesting and important. Try to avoid both. If you say “X is interesting” as an argument for why you are picking X, that does not tell the reader much. Show the reader why X is interesting by explaining what X is or what X does. The same goes for “important.” If you have to tell a reader that something is important, then it probably is not. Show the reader why something is important by explaining your reasoning. Avoiding these words involves difficult writing skills, but the clarity of the writing is enhanced when you do so. In writing these instructions, we were tempted to write:

> These paragraphs are the most important in your essay.

But does that tell you why? That sentence was replaced with:

> These paragraphs are essential for demonstrating your potential engagement with the research.

Does that tell you more about what we want to see in your essay? We hope it does.

Why does potential engagement matter? The mentors are volunteering their time and resources for our program. All are committed to undergraduate education, particularly undergraduate research, and want to see you succeed. They need to know that you are committed to doing your best given your educational opportunities to date. Saying that you will do your best is, frankly, just words, even if heartfelt. Demonstrate through your responses that you are going to try your best by following directions and expressing deeper thoughts. Doing so will help us convince your potential mentor to invest in you.

We hope to see you next summer!

Dr. Jenny Gleason  
Dr. Deborah Smith  
Program Directors