

Bowdoin College  
Goldwater Scholarship  
**TIP SHEET**

**Short Answer Essays**

Question	Tips from our office
<p><b>#1</b> <i>In one or two sentences, describe your career goals and professional aspirations. This statement will be used in publications if you are selected as a scholar or honorable mention. (200 character limit including spaces)</i></p>	<ul style="list-style-type: none"> <li>• Don't overthink this one; just list your degree, area of research, and environment</li> <li>• <i>Ex. Ph.D. in Molecular Biology. Conduct research in biomedical science and teach at the university level.</i></li> </ul>
<p><b>#2</b> <i>What are your career goals and professional aspirations? Indicate which area(s) of mathematics, science or engineering you are considering pursuing in your research career and specify how your current academic program and your overall educational plans will assist you in achieving your career goals and professional aspirations. (3000 character limit including spaces)</i></p>	<p>Goldwater says:</p> <ul style="list-style-type: none"> <li>• Talk with your faculty to better understand what a research career entails – both research mentors and non-mentors, other professionals in the field, and, if available, post-doctoral research associates and graduate students, about their research and career experiences</li> <li>• Provide your specific plans for graduate school, post-doctoral research (if-possible), and research experiences that support your career goals</li> </ul> <p>Tips from our office:</p> <ul style="list-style-type: none"> <li>• Lay out the “stepping stones” of how you want to get to the career goals/professional aspirations laid out above               <ul style="list-style-type: none"> <li>○ What have you done/will you be doing at Bowdoin?</li> <li>○ What are your plans beyond Bowdoin? (Go ahead and name one or more specific graduate program(s) you see that as an ideal setting to demonstrate your research into this path)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ What about after graduate school?</li> <li>● Show them that you have realistic expectations of what you need to be doing and where that can be done along your path. Remember, because this is Goldwater, they want to hear about your STEM pathway—this isn't the space to discuss your side interest in dance or service at local food pantries.</li> </ul>
<p><b>#3</b>  <i>Describe an activity or experience that has been important in helping shape or reinforce your desire to pursue a research career in science, mathematics or engineering. (1500 character limit including spaces)</i></p>	<ul style="list-style-type: none"> <li>● There are a lot of different ways to answer this question. Some we have seen work well include: <ul style="list-style-type: none"> <li>○ touching on a childhood experience that lit a lifelong interest in subject</li> <li>○ describing a meaningful experience in a formal or informal setting (e.g. Bowdoin classroom, lab, summer work, even a personal observation/discovery in nature)</li> <li>○ encountering your interest in your chosen sub-field</li> </ul> </li> <li>● Take your reader through that moment of the spark of your curiosity. Describe joy you have experienced in discovery. Signal you are prepared for a career of hard work, mistakes, and incremental payoffs. This writing may take a more creative tone than the Research Essay.</li> </ul>
<p><b>#4</b>  <i>(Optional) Goldwater Scholars will be representative of the diverse economic, ethnic and occupational backgrounds of families in the United States. Describe any social and/or economic impacts you have encountered that influenced your education - either positively or negatively - and how you have dealt with them. (1500 character limit including spaces)</i></p>	<ul style="list-style-type: none"> <li>● When answering this question, we recommend you focus on the phrase “that influenced your education...”</li> <li>● Goldwater is all about the science, so whatever circumstances you have navigated should be providing context for your academic success, dedication, and preparation for a career in STEM.</li> </ul>

<p><b>#5</b>  <i>Answer only if you have or will study abroad: Please describe how your Study Abroad experience is relevant to your career aspirations. (1000 character limit including spaces)</i></p>	<ul style="list-style-type: none"> <li>• This is a great opportunity for those who have/will be studying abroad in a field school, research university, or any other program that encompasses a STEM focus, to put that opportunity into context for the reader <ul style="list-style-type: none"> <li>○ Discuss why you chose this opportunity (again putting the focus on the STEM aspects)</li> <li>○ How it augments what is offered at Bowdoin</li> <li>○ What if any lab/field experiences will be incorporated</li> <li>○ Assume your reader is not familiar with your host institution/program</li> </ul> </li> </ul>
<p><b>#6</b>  <i>Answer only if you plan on attaining a M.D., M.D./Ph.D., D.O., D.O./Ph.D, D.V.M, D.V.M./Ph.D. degree: Explain why a medical or veterinary degree is necessary for you to achieve your research goals? (2000 character limit including spaces)</i></p>	<p>(quoting email from Goldwater Executive Director in response to a question about the likelihood of a student wanting to pursue a medical degree alongside a PhD, given how the focus of Goldwater is on research rather than medical care):</p> <p>“Your question about whether or not we would support a student who wants to do research in a clinical setting with an M.D. degree raises an interesting question. Goldwater has supported students who go into medicine IF there is clear evidence that they intend to conduct medical RESEARCH. That this is the case is clearer when they indicate that they intend to pursue an MD/PhD and can explain why obtaining the MD degree will be an asset to them in this regard. Generally, and particularly in the recent past, those students who simply intended to pursue an M.D. have been discouraged/excluded from the competition. Today, of course, there are individuals with medical degrees who are doing research in a clinical setting as you describe. If there is such a student at your institution and your institution decides to put that student forward as one of its four nominees, the nomination will be reviewed. However, I think it is fair to say that it will be reviewed with more skepticism than nominations in other areas (given that 99.9% of students who get an MD plan to become practicing physicians with no intention of doing research) and, as such, the burden of proof that the student actually intends to pursue research in this area rests with the student and those nominating the student. There is little doubt in my mind that</p>

	<p>the “bar” will be set higher than for other nominees. I believe a survey of the “intended” degrees of students who have won Goldwater awards would reveal few who stated that they intended to pursue an MD.” Also the GW website’s FAQ includes this general guidance in response to the question “Can a student who intends to pursue a Medical Degree receive a Goldwater Scholarship?” <a href="https://goldwater.scholarsapply.org/faqs-3/">https://goldwater.scholarsapply.org/faqs-3/</a></p>
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## Research Essay

Prompt from Goldwater:

*As you complete your application, please keep in mind that the individuals who will be reviewing your application will be attempting to evaluate the likelihood that you will pursue a research career in the natural sciences, mathematics or engineering. Therefore, your responses should help the reviewers understand that you have the appropriate background, experience, skills, temperament, and interest to pursue a long-term career in research. This does not mean, for example, that you should simply state that you have the temperament but that you should demonstrate through your work that this is the case.*

- Your Research Essay is one area of the application where you will be able to demonstrate these characteristics. The strongest Research Essays students submit are based on a prior research project. Your essay should include a description of the issue or problem, a discussion of the research methodology, and discussion of your findings. When writing an essay on a past research experience, it is important that you clearly state what **YOUR** specific contributions to the project were and indicate what specific skills/expertise you developed. To demonstrate that you “think like a scientist,” you might, as an example, describe future work your data suggests or work that still needs to be done to complete the current project.
- If you have not been involved in a research project, you can develop your Research Essay on a “proposed” research project. In this case, you will want to put forward a possible research problem, discuss an idea for a research project that could have a significant impact on the issue or problem, describe the methodology that you would use and discuss anticipated results. Again, the reviewers will be reading your nomination materials attempting to determine the likelihood that you will pursue a research career. It is again in your interest to work to convince the reviewers that you have the characteristics that are needed to become a research scientist, mathematician or engineer.
- Your Research Essay should include appropriate bibliographic information and references.

**Formatting:**

- Single spaced
- 12 pt. font
- Arial (not Times New Roman!)
- 1-inch margins on all sides
- Length, including bibliographic information and references, must not exceed 3 pages
- Applicant's name and the name of the nominating institution in the header of each page
- Single or double column format may be used
- As appropriate, utilize graphs, tables, and figures in the essay to explain or clarify results
- Elements of the essay – narrative, bibliographic information, and references
- As long as a reviewer can easily understand what is being referenced, one can “abbreviate” a reference

**Additional Guidance:**

- Below is an email from John Mateja, president of the Goldwater Foundation:

The Foundation routinely receives questions about the research essay. Students often phrase the question in this way, “What are the elements of a strong research essay” while Campus Representatives will ask “How should I advise my students on writing their research essay?”

To answer this question, it is important to have a basic understanding of what the reviewers are trying to do when they read students' nomination materials. Quite frankly, there is nothing mysterious about the answer. The Goldwater reviewers are simply attempting to determine who among the nominees are the most likely to pursue a research career in the natural sciences, engineering and mathematics and trying to identify the best from among this group. In short, the reviewers are trying to identify individuals who demonstrate a passion for doing research and the creative spark that will make them leaders in their fields in the years to come.

Everything in the nomination packet should help the reviewers understand that the nominee they are reading about is this individual. Is there one way to achieve this in the essay? Unfortunately, there is no single or magic formula. The research essays will be as varied as the students who are submitting them. There are, nonetheless, some characteristics among competitive essays that are worth noting.

One of the best ways students demonstrate their passion for research is by doing research. Can students really “know” they have a passion for doing research if they haven’t had to stand next to a lab bench for 16 hours, spent days working through a difficult set of mathematical equations, faced the research failures that will routinely occur, or had to deal with the mundane side of science (yes, someone has to order the supplies)? Telling the students’ research stories, specifically relating to the reader what the students contributed and what they got out of the experience, helps the reviewer evaluate student interest in and passion for doing research.

Doing research, from which I would exclude routine laboratory or lecture experiments that are part of a structured course, can take on many different forms. Experimentalists will often engage students in larger, ongoing projects. Theoretically inclined students may work more independently. In some instances, prior research experiences in more theoretically slanted projects may primarily involve reading the literature, possibly talking with a faculty member, and developing an idea. Our reviewers report excellent examples of this kind of work in mathematics, for example. In all cases, however, it is important that students demonstrate ownership of the project, or some part of the project. Another important point particularly applies to experimental work. Students do not have to be involved in research that occurs on the world’s largest particle accelerator. Students who demonstrate sophisticated or elegant thinking and analysis of the ecosystem of the pond behind their dorm can be just as competitive.

It is helpful to the reviewers if they can also see that the students “think and behave like scientists.” One way for a research essay to help demonstrate this is for students to put forward ideas for new research based on what has just been done. Alternatively, students may want to suggest entirely new lines of study explaining, at least in part, how the skills they have developed are useful to this new line of research. Showing correlation between what’s been done (skills that have been acquired) and what is to be done (new line of work) will strengthen the overall essay.

There are, of course, students who have never been involved in research. For their research essay, these students should develop a research proposal in an area of research that is of interest to them. As with any research proposal, the essay should put forward a question, present the relevant literature, present a hypothesis, outline the research methodology and discuss anticipated results. Just as with those students who are presenting and building upon prior research experience, those putting forward proposals for which they have no prior experience should work to convey their interest and ability to carry out the project.

Finally, space in the research essay should be used judiciously. Balance the various elements of the essay so that no one section dominates the essay. Include a bibliography that includes up-to-date, refereed journal articles. Use diagrams and figures, as appropriate, but not at the expense of quality narrative. And always, anticipate the need to write multiple drafts, each reviewed by the student's faculty mentor. Write, rewrite, and then rewrite again the research essay. Your readers have a limited amount of time to read the essay so you want to make certain your essay makes your points as clearly and as concisely as possible.

- In 2013, an article written by John Lanning and Frank Gilmore, "All In" (published 2013, excerpt below from page 38), addresses the Goldwater research essay, advice which has not changed:

*The ideal essay is one written by the nominee reporting on a research project she or he has completed. The essay should be written as if it were an article to be published in a scientific periodical and read by a professional audience. Methodology that is well documented in the literature should be referenced and not described in detail in the essay.*

*The first page should be devoted to describing the project and its essential methodology, and the second page should be devoted to the results, including the data collected, and to an analysis of the results, including the data and the significance of the findings. If the research project is underway but not completed, the first page of the essay should be similar to that for a completed project. The second page should discuss the work that has been completed, followed by what data have been collected and what will be collected. The final part should discuss how these data will be analyzed.*

*Nominees not having completed or initiated a research project should select a topic about which they are passionate and describe a possible project and the method of conducting the research. The scientific question to be addressed by the research should be clearly defined, and the description of the research to be done should specify how the work will answer this question.*