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## Introduction to Writing Research Proposals

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In this handout we will discuss some of the basics of how to write a Research Proposal. The main goal of a Research Proposal is to convince someone to give you money. To that end, you will have to be an expert salesperson and convince your audience, usually a panel of experts in the field or a closely-related field, that your body of research is worthwhile.

Traditional Research Proposals can be anywhere from 5–50 pages long, depending on the funding agency and the amount being requested. The Proposal is broken down into four parts:

1. Cover letter: typically a single page in which you introduce yourself to the funding agency and introduce the topic.
2. Project Summary: a one (or two) page summary of the project.
3. Project Description: a complete breakdown of the project that includes the background information, complete enumeration of lab instrumentation/techniques, timeline for the project, budget, and expected results. This is the component that determines the length of the proposal.
4. References: a complete set of ACS-style references for the proposal.

The proposal that you will be writing will be the *Project Summary with References* (#2 and #4). As a side note: the Project Summary that you are working on here is exactly the type of proposal that students applying for summer fellowships and research internships might be asked to write.

### Project Summary

In many ways, the Project Summary is the most important part of any research proposal. The Project Summary has the longest shelf-life of any submitted report/proposal; in fact, the funding agencies will retain the Project Summary, as record of the project, even long after the project has been completed. It is for that reason that the Project Summary must be written as if it were a stand-alone document.

### Content and Organization

The Project Summary has five major components (the first three components are, traditionally, heavily cited):

1. *Introduce Topic*: The proposal should start by introducing the topic of the research project and discussing the general project goals. This should be fairly general, as the specific expected outcomes will be discussed later in the proposal.
2. *Emphasize Significance*: After introducing the topic and goals, the overarching significance of the research is discussed. Why is this important? What are you hoping to demonstrate? What effect will this have on the field and on the world? It is very important to be convincing here. Remember: your goal is to elicit carefully-guarded, highly-coveted, and difficult to acquire funds.

3. *Summarize Methods:* This is the most important (and hence longest) component of the proposal. Now that the topic has been thoroughly introduced and motivated, the next step is to summarize the methods that will be used in the context of the goals/aims of the work. Here, Methods refers to (a) traditional techniques that will be used, (b) non-standard equipment/instrumentation that is needed, and (c) novel approaches/techniques that will be developed for the research project. Also discuss and mention if your work will be some sort of modification or combination of existing techniques.

It is important to be very clear and **specific** about how the research will be carried out; this is an integral part of convincing the funding agency that it is worthwhile to invest in your project. That said, you should not turn this into an Experimental or procedure. Include details such as specific approaches (digestions, sample preparation, sample handling, etc.), number of trials, and instrumentation; but refrain from giving exact amounts, lists of glassware, and step-by-step experimental details.

It is helpful to break up each of the goals/aims of the project and to list the methods involved for each. These are often referred to as **Specific Aims** and are usually part of a standalone, one-page document. The methods attributed to each of the aims should be described.

#### Writing Sample 11.1: Specific Aims

“**Specific aim #1** is to determine the efficiency of green washing machines (GWMs) using a combination of digestion techniques and high-performance liquid chromatography. A series of ten dirty, chocolate-stained sock samples will be digested according to the Villar method<sup>1,2</sup>.”

Notice that the specific goal is identified first, along with the general approaches that will be used. Then, the specifics for these methods are given; enough to give the relevant details of how the work will be carried out, but not so much as to constitute an experimental procedure.

4. *Expected Outcomes:* While the actual results of the research are never known *a priori*, it is important to have a good sense of what the results might be. Often, authors make reference to preliminary data or previous work that is similar to the project. Since you already have some preliminary data from your project, this would be a good place to use that work.
5. *Summarize Broader Impacts:* The final portion of the Project Summary is to summarize the broader impact that the results of the research will have on the field and, possibly, the world. It is important that these outcomes relate to the motivations, or at least be framed in the context of the motivations already mentioned earlier in the proposal.

## Format and Style

The project summary always starts with the title of the proposal, the name(s) of the principal investigators (PIs), the institution(s) of the PIs, and the date of the proposal. Some funding agencies assign codes/identifiers to PIs and should be included when relevant.

In general, Project Summaries are no longer than two pages with size-10 font. Spacing and margins are rarely specified in the requirements. Many have the good practice of using bold face for the key words that start one of the above components. For instance, “**The goal** of this study”. This practice calls the reader’s attention to these components.

## Voice and Tenses

Unlike the journal articles that you've written until now, which are mostly written in the past tense, Research Proposals are partially in the present tense and part in the future tense. All of the introductory material (components 1 and 2) are written in the present tense, as they discuss the current state of the scientific art. The methods, expected results, and broader impact, are all referring to research that may, or may not, take place - in the future.

Another major difference between Journal Article writing and Proposal writing is with regard to the voice. The vast majority of a journal article is written in the passive voice in order to emphasize that the results obtained are not dependent on the scientist, or research group, involved - anyone would have received the same results. In contrast, in a Research Proposal only the methods and impacts sections are written in the passive voice (depending on the context, methods can sometime be in the active voice as well). The remainder of the proposal is written in the *active voice*. Unlike in a journal article, where the emphasis is on the results of the experiment with the idea being that any competent researcher would achieve the same results, in a Proposal you want to emphasize your own involvement in the successful outcome of the research - you don't want a funding agency believing that just anyone could do this research. You want them to know that it has to be you.

## Argument

In the past, your arguments have focused on the results of your experiment and their implications. Your goal was to convince the reader that your results have substantial impact and importance in light of the significance of the research area.

The argument you are trying to make in your proposal is quite different. Instead of putting the results into context, your job is to convince the referees (people that are reviewing your proposal and deciding on funding) that you will make excellent use of their research funds. To do this you will need to (a) demonstrate the importance of the research area; (b) explain your well-thought-out plan that you **will use** when executing the research; and (c) clarify the research outcomes and impact that your work **will have**. Notice the declarative voice - this is deliberate; your proposal should be written with confidence and purpose (with the references and research to back it up).

Consequently, the *Argument Summary* that you will write for a proposal will be different than one for a journal article. Use the above-mentioned guidelines while contemplating your arguments and writing your Argument Summary.

## References

This section always starts a new page. The References are listed by number, in order of first-citation in the Proposal, and are always formatted according to the American Chemical Society (ACS) guidelines. When page limits are imposed for research proposals, the References are almost never included in those limits (this will be the case for us too).

## Common Mistakes

The most common mistakes that people make when writing a Research Proposal are:

- Starting to write without first preparing an Argument Summary and a checklist. The success of the proposal will be determined by the strength of the argument, the merits of the science, and the quality of the writing. It is critical that a good checklist, which is designed to form a good argument, be constructed prior to writing the proposal. A successful checklist will also indicate

which the corresponding component of the Project Summary for each item on the checklist and will also include references.

- Splitting up the work before agreeing on the vision of the proposal. This inevitably leads to a disjointed proposal and duplication of effort.
- While most reviewers might not focus on them explicitly, using the wrong verb tenses (or moods) makes the proposal a more amateurish read. The general feeling that the reviewer gets from reading the proposal can often make the difference between getting funded, or not.
- Make sure that the broader impacts are directly related to the significance of the research – this will help tie together the whole proposal.
- While it is difficult for first-time proposal writers, it is important to reach an appropriate balance of detail in the methods section.

## BU UROP Proposal Considerations

The above details are a good place to start when it comes to writing your BU UROP research proposal. The UROP application, however, breaks much of this down into smaller sections. Make sure to use the space that they provide (and limited character count) appropriately.

Consider the following while working on your UROP proposal:

- Make sure that it is evident that you've been working with (or at least taking with) your research mentor for a long time. In general, students that are already engaged in research get funded.
  - In response to the question about where you heard from UROP, select “From my mentor.”
  - To the question “Have you worked with this mentor before?”, this includes discussing the project and preparing the project.
  - Write the *exact location* (building at BU and room) where you will do the research
- Make it clear that you are invested in this project (and even without funding).
  - Hours per week: 40-50
  - Include training dates (do the training) that are before this semester, if possible.
- Make sure that you write the proposal, not your mentor. Reviewers do not want to see your mentor's R01 proposal in a shorter format.
- Use appropriate language and terminology – you need to sound (be) expert. That said, don't plagiarize.
- Peer review, work early

For the specific questions in the proposal:

- *Project Description and Goals*. This is a brief overview and summary. Include: (1) what you will do, (2) a broad idea of how you will do it, (3) what you hope to find, and (4) how it relates to other work (in the same group, in the world). No symbols or equations. (3000 characters)
- *Project Significance*. Why should someone care? Look at other journal article Introduction sections. This is significance and impacts from above. This is written for non-experts. (1200 characters)

- *Methodology*. Specific aims. Lots of references. (3000 characters)
- *Time Line*. Include previous work/semesters. Be reasonable with what you can accomplish (could come back to haunt you). List numbered goals, by month/semester and year. Include presentations, conference talks, and publications. (1800 characters)
- *Background Experience*. First person narrative. Include your coursework-based research experiences, if applicable. Tell them what got you excited for THIS research. Coursework and relevant skills that will help you succeed. (2000 characters)
- *Bibliography*. Fill these 2500 characters. Numbered sequentially throughout the rest of the application (one set of numbered references for all of this).
- *Appendix*. Do not use, except for additional references. They won't read it.

If you've received UROP funding before:

- *Request for continued funding*. Review goals from previous proposal (short) and talk about how the new goals complement/extend the old goals (remainder of the 3000 characters)
- *Goal/Complete*. Use the goals/timeline numbering from your previous proposal, and mark each as 100% complete (done), 90% complete (will be done by summer), 50-90% complete (in progress, by end of summer for sure), 25-50% complete (everything else), 0% (we chose not to do it).



# UROP Summer 2021 Application Form

## Directions

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Dear UROP Applicant,

**IMPORTANT: For Summer 2021, international students residing outside the US during the 10-week UROP program are not eligible to receive salary funding from Boston University. Therefore, we cannot accept applications from international students conducting research outside of the US. Additionally, if you receive funding, and then move outside of the US, you will need to withdraw from UROP as we will not be able to pay you. If the situation changes regarding international student hiring, we will update the website and this application accordingly.**

As you prepare your application for funding from the Undergraduate Research Opportunities Program (UROP), **please read these instructions carefully**. For more information on funding, eligibility, and any restrictions, [please consult our website here](#).

**Only online submissions of applications will be accepted. Students can submit only one application per semester.**

A completed UROP application consists of this online application form and a letter of recommendation form completed by your BU faculty mentor. An online submission of your **application is due by 12:00PM (noon) on the day of the deadline**. Your faculty mentor must complete an **online recommendation form by 11:59PM on the day of the deadline**. Please discuss time commitment, award type, and expectations with your mentor prior to submitting your application. If there are any time or award request discrepancies between you and your mentor, we will consider you for the lowest requested amount.

Upon submitting this application, your mentor will receive a prompt to submit your letter of recommendation along with a copy of your application. With that said, **it is your responsibility to ensure your faculty mentor completes the letter of recommendation form**. If your mentor is looking to submit their letter of recommendation, direct them to the "for mentors" page on the UROP website, where they will log in with their Kerberos information and complete the form.

Keep your responses within the word limit of each field; you may not continue your responses in the

Appendix.

If you have any questions or encounter difficulties, it is your responsibility to contact the UROP Office at [urop@bu.edu](mailto:urop@bu.edu) or call 617-353-2020.

### Statistical Data Collection Page

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Providing information on this page is strictly voluntary, and this page will not be included when your application is sent to reviewers. Data are collected solely for statistical purposes for reporting to agencies that request such information (including granting agencies that supply funding to UROP) and for evaluating our program. The data will not be used during the evaluation or award process.

Please select your race/ethnicity:

- African-American/Black
- Asian
- Caucasian/White
- Hispanic/Latino
- Native American
- Pacific Islander or Native Hawaiian
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Please select your immigration status:

- US Citizen
- US Permanent Resident ("Green Card")
- Foreign National/International Student

Please select your gender:

- Male
- Female
- 

Please enter your GPA:



- How did you hear about UROP? (check all that apply)
- From my mentor
  - From another professor
  - From a non-UROP staff member
  - Through a BU website
  - Listened to UROP staff speak to a student group/class
  - From a Classmate/Friend
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**Applicant Information**

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First Name \*

Last Name \*

Preferred Name (if different than above)

Preferred Pronouns \*

BU ID Number \*

BU E-mail Address \*

College \*

Major \*

Year at BU (during AY20/21) \*

The month and year you will receive your bachelor's degree \*

Faculty Mentor's First Name \*

Faculty Mentor's Last Name \*

*Your mentor must be a member of the Boston University faculty. Neither postdocs nor graduate students may serve as the mentor of record for UROP projects.*

Faculty Mentor's College \*

Faculty Mentor's Department \*

Faculty Mentor's BU  
Email Address \*

Have you worked with this mentor before? \*

 Yes  No

Will you be conducting your research in the United States? \*

- Yes, I will be in the United States while I am conducting research.
- No, I will not be in the United States while I am conducting research

Will you be conducting your research within the Boston-area?

- Yes, I will be conducting my research within the Boston area.
- No, I will be conducting my research outside of the Boston area.

Where will you be performing your research? \*

Will you be receiving any academic credit for this research work? If yes, then you may only apply for a Supplies Award. \*

 Yes  No

### Award Types

Faculty Matching Grant (FMG): a stipend half of which is provided by UROP (the amount chosen below) and half is provided by your mentor. Ensure that your mentor has matching funds. For a Faculty Matching Grant (FMG), your faculty mentor must have matching funds totaling half of your requested award amount. For example, if you apply for a total award of \$5,400.00 (40 hours/week), your mentor must provide \$2,700.00 in matching funds.

Student Research Award (SRA): a stipend that is funded entirely by UROP.

Supplies Award: funds that are provided to the mentor's department to cover supplies needed for the research project. You may only apply for a supplies award or a stipend award, not both. Supplies awards will not exceed \$500.00.

For what type of award are you applying? \*

Are you enrolled in or planning to enroll in summer classes at BU?

- Yes  
 No

Boston University summer courses vary in the number of in-class hours required per week. The number of in-class hours (including all lectures, discussions, labs, and pre-labs) plus your requested UROP stipend hours must not exceed 40 hours/week.

For example, if you are taking a course with 17 hours of class time per week, you can only apply for a 20 hour/week stipend. If you are taking a course with 9 hours of class time per week, you can apply for either a 20 hours/week or 30 hours/week stipend.

Are you a Kilachand Honors College student? \*

- Yes  No

Does your proposed project concern COVID-19?

- Yes  
 No

Have you previously been awarded UROP funding? \*

- Yes  No

## Project Information

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Project Title \*

0/500

Project Description and Goals - Provide a description of your research proposal written in terms that can be understood by someone outside your field. Include your project's overall objectives as well as the specific goals you plan to accomplish this semester. \*

0/3000

Project Significance/Importance - Explain in general terms why the information gained from this research project will be beneficial. What is the bigger picture of your research project? \*

0/1200

Methodology/Process - Clearly state how you plan to accomplish the goals listed in your project description. Identify the specific steps necessary to perform your research. \*

0/3000

Time Line - Provide a detailed timeline for completion of goals of your project. Include goals listed above. \*

0/1800

Background Experience - List any previous research experience, applicable course work, or other relevant experience you may have. \*

0/2000