**Project Plan**

Email completed plan to your program coordinator.

**The preparation of a project plan has several important purposes:**

* It ensures communication between you and your mentor and/or your co-mentor prior to the start of your project
* If well done, it shows that you have an understanding of what you will do and why the work is necessary or desirable
* It outlines the approach you will take to carry out your task
* It provides a schedule or timeline for accomplishing the individual steps and overall goals of your project
* It encourages your mentor and his or her staff to make the arrangements necessary to accommodate you and your needs before your arrival

The purpose of these guidelines is not to provide a template that you must follow, but rather to suggest a structure for your paper and to encourage you to think more deeply about the content of the different sections. Your mentor may suggest a different approach for you to take in developing and writing your plan, and you should follow his/her advice. Also keep in mind that what you submit should reflect the conversations you have had with your mentor and the guidance you have received from him or her, but it must be your product.

**How can I do this? I have no experience and no prior knowledge of the subject.**   
Many first-tier jobs require that you follow step-by-step instructions given to you by your supervisor, day by day. Such jobs often do not require that you have a good understanding of where your work is heading, why it is being done, or what to do when something goes wrong. Such work is also often not satisfying or fulfilling because it does not allow or require you to become personally engaged.

Success in research demands that you be deeply involved in what you are doing, understand its purpose, and take personal intellectual responsibility for accomplishing its objectives, as well as (for example) figuring out what to do when you run into obstacles. (What to do may be to seek help from other people!) The sense of personal accomplishment that can come from prevailing against all obstacles and reaching your goals can be deeply satisfying, even exhilarating.

The best way to prepare for a research project in any field (science, engineering, or technology advancement, for example) is to do the preliminary groundwork that a proposal or research plan requires of you. Asking for such preparation from you is our way of helping you get a running start.

**Who will read my project plan?**   
The people who will read your plan will include your mentor and/or co-mentor, technical reviewers for the program, and the program coordinator(s). The primary beneficiary of the plan, however, will be you, in that the work that you have to do to prepare to write it, and the writing itself, will help you clarify your thinking about your project and its purpose.

**How long should the plan be, and what should be included?**   
A research plan of two or three pages carefully thought out and precisely worded, should be sufficient to make all the important points. Concerning structure and content: start out with the sections indicated below and try to answer the questions provided in each part. When you havethis material developed, you may be able to reorganize it so that it flows more logically while covering the same ground.

**Introduction/Background**   
What is the general technical area in which you will be working? What is the problem that you are trying to solve, and how did the problem arise? Why is its solution interesting or worthwhile? What is the status of related research by your mentor or by the group that you will be joining, and what will be the contribution and significance of your effort if it is successful?

You will probably have to ask your mentor a lot of questions and read some or all of the reference material provided for you in order to answer these questions and others below.

**Objectives**   
What do you aim to accomplish in your project? What will you measure, and under what conditions; or, what will you calculate, model, or simulate; or what will you design, and what are the requirements; or what will you build or test? What is your starting point? What are your initial assumptions or conditions? What will be the result or product of a successful outcome for your project? What are the criteria for project completion or for success? (In other words, how will you know when you have accomplished what you set out to do?)

**Approach**   
Specifically, how will you reach your objective or produce your desired final product? What are the principal steps or milestones along the path? How long will each take? What steps promise to be the most difficult, and how will you overcome the difficulties? What equipment or other resources will you need? Which of these are inherited, and which will you have to make or procure? With what other people or groups will you be collaborating? Will completion of your project depend on results from other people in related projects? (That question may be especially pertinent for team projects.)

**Project Schedule**   
Preparing a schedule of the principal activities and events is a good way of showing the readers that you have taken a systematic approach to planning your work.

**References**   
List all pertinent papers or reports that you have consulted to prepare your plan. Include remarks or suggestions from your prospective supervisor, from graduate students, or from other people with whom you have talked.

### Progress Reports

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| http://edustudents.jpl.nasa.gov/images/progress.png | **The purpose of the reports is:** To help you focus on the goals of your project and your progress toward those goals to provide a basis for discussions with your mentor and co-mentor to help provide a framework for the final paper. We encourage you to use the reports as a tool to practice and strengthen your technical writing skills. We suggest that mentors use these reports to help students develop their technical writing skills. Guidelines for each progress report are below. Mentors may have other suggestions and ideas for material that should be incorporated into these reports. The reports must be approved and signed by the mentor (not the co-mentor.) |

**First Progress Report:**

* Write in some detail the motivation for your project. It should include background and an overview of the ongoing work in the laboratory. You should include references.
* Discuss the problem you are working on and explain how it fits into the ongoing work. Explain your approach and outline the methods you expect to use./li>
* Discuss the progress you have made on your project, your goals for the next month, and the methods or approach you will use to reach your research goals.
* What are the challenges and problems you have met so far and what challenges and problems do you anticipate?
* What resources will you require?

**Second Progress Report:**

* Discuss in detail the work you have completed over the past month. (Describe your experiments, progress on data analysis, etc.) Include exact technical specifications and quantities and source or method of preparation for work you have done thus far. You should present the methods in chronological order if possible.
* Discuss the progress of your work so far. What observations have you made? Describe how your observations are (or are not) in line with what you expected./li>
* Describe any problems you have encountered. What was the source of the problem, and how have you worked (or how are you working) on solving the problem(s)?
* What are your research goals for the remainder of the project? Have these goals changed since you started working on your project?

### Final Presentation

Students and Faculty are required to deliver a final presentation, providing a summary of work completed, and an explanation of how the project aligns with the research at JPL. The presentation should concisely describe the parts of the project for which he/she took ownership, and should demonstrate technical understanding.

**The JPL Education Office will provide detailed information on the final presentation at the appropriate time during the internship. The following are general guidelines for the final presentation:**

* Mentors will schedule your final presentation and invites attendees for closed/internal presentation
* Each presentation should last for 15 minutes, followed by 2-3 minutes for questions and answers. A session chair should be present in each session to facilitate.
* A resident computer is in the conference rooms, however presenters should bring their presentation on a flash drive in a format that's compatible with Microsoft Office 2007 using Microsoft Windows XP 2002.

### Final Written Report

**Final Report Writing Requirements**

*Final reports should be clear, concise, and written for a broad scientific audience. Consult with your mentor to determine a style usually used in his or her discipline. Reports should place all technical information in the 'Methods' section at the end of the paper while making the main text accessible to a nonspecialist audience. Use clear, significant words when writing your paper and avoid using jargon or specialized terms whenever possible. (We no longer have a word limit in place for your final report.) It is often useful for authors to have students in other disciplines read their papers to improve clarity. Work with your mentor and co-mentor to edit your paper.*

* **The Final Report Format:**
  + Title
  + Author
  + Faculty Mentor (and Co-Mentor if applicable)
* **Abstract.** The abstract is a succinct outline of the research project. For experimental projects, it presents the principal objective and scope of the project, describes the methodology, summarizes the results, and states the principal conclusions. For a theoretical paper, it describes the issue and analysis, and states implications for further research. The abstract should stand alone and be intelligible without the paper.
* **Text.** The paper should begin by providing background, presenting the nature and scope of the problem being investigated, and giving rationale for the work. The main conclusions should be stated briefly in this section. This section should be accessible to readers in any discipline (including non-science fields) and readers for whom English is not a first language. Following this introductory section, the findings should be described concisely with brief descriptions of the methodology when necessary. The text should finish with a discussion of the results. The implications of the research, relation to other work in the author's lab, and future research directions should be included in this section. Even though this section may be technical, it should not be obtuse.
* **Methods.** As noted above, materials and methods may be described briefly in the text. However, lengthier descriptions belong in a 'Methods' section at the end of the paper. This section should be subdivided by short headings referring to the technique being used or the experiment being explained. This section is directed toward scientists in the author's field.
* **Figures.** Include figures whenever possible to illustrate your points. Explanatory diagrams may help explain background information (pictures from textbooks are fine). Carefully choose your image size, font size, line widths, and labels to ensure that your figures are clear. Plot theory and experiment on the same graph and redraw screen photos. All figures should be accompanied by explanatory captions.
* **References.** Authors are responsible for the accuracy of references. References should be numbered sequentially as they appear in the text and should be listed at the end of the paper. Reference numbers should be in superscript when cited in the text.
* **Acknowledgments.** Acknowledge your mentor and all other individuals who provided technical assistance, and the individuals, organizations, grants, or contracts from whom you received financial support. Students should be sure to include the names of their financial sponsors.
* **Appendices.** Large data files, catalogs, tables, diagrams, and archival information may be included in 'Appendices' at the end of the paper.

**Instructions for Submitting your final paper**   
*Submit your final paper to your program coordinator*