

**Research Proposal****Goal:**

To identify a real world chemical problem that could be investigated at Queens University, and identify possible analytical techniques for the investigation of this problem.

**General Format:**

Ideally, the proposal will be 4 to 8 typed double spaced pages (1" margins, 12 point or 10cpi type), not including references, or any figures, etc. At least 4 references are required, 2 of which should be from current analytical chemistry journals or books.

Introduce the problem, making the point of why it is worthy of study. Then describe at least 2 analytical/instrumental techniques for measuring the chemical quantity of interest. State which method is best (most accurate/precise/sensitive), and which method would be most practical to use at Queens (hopefully these will be the same!) You will most likely need to consult with the instructor to decide which method could best be used at Queens. Then outline the procedure that you will use. This should be a brief description that references a more detailed procedure. In other words, don't try to describe every step in the analysis. Also discuss proper sampling techniques for your procedure, and explain what types of statistical analysis will be needed to analyze your results.

After defining the problem and describing your proposed experiments, you will need to prepare a budget. (A research proposal is basically a request for financial support.) Unfortunately, the chemistry department is unable to provide funds for salaries. Therefore, your budget will be limited to chemicals and other supplies. Make a list of any special chemicals and equipment that you will need. Then check our inventory and determine which supplies will actually need to be purchased. Then look in catalogs to find the actual prices. Be sure to list the company name, catalog number, and quantity for each item. Contact the instructor if your budget is over \$125.00.

Don't forget to include a conclusion!

I recommend that you photocopy the articles (copy references too!) and important parts of books that you use for references. You will need these when you carry out the experiment next semester.

***Format Details:***

There will be 4 main sections to the Proposal, as follows:

**I. Summary (write last!!) describe in two paragraphs**

- 1) the intellectual merit of your proposal
- 2) the broader impacts of your proposal

**II. Project Description**

- 1) Introduction: explain the main ideas behind your project, and explain why it is important
- 2) Materials and Methods: This is where you explain the possible methods for your project, and focus on the methods you will use.
- 3) Data Analysis and Presentation: How will you analyze your results. How will you distribute the results?

**III. References**

Choose a format from any chemistry Journal (I like *Analytical Chemistry* or *J.Chem Ed.*) and state what format you are using at the top of the first page.

IV. Budget Justification

List the items you will need, providing sources and catalog numbers for any item that we don't have. Explain why these things are critical to your project.

**Grading:** Your proposal will be graded on content, completeness, organization, style, and grammar. Try to keep your paper on a formal, scholarly level, without being too stuffy.

**Rubric:**

I. *Intellectual Merit:* 45 points total

1) *Feasibility* 10

(Is this project practical and doable in a few weeks time?)

2) *Creativity* 5

3) *Organized Plan* 30

(It should be easy for a chemist to understand your plan for carrying out the project)

II. *Broader Impacts* 5

How will the project affect your education? The Queens Community? Society?

III. *Writing Quality* 15

Your writing should have clarity, good grammar and style, and be reasonably free of typographical errors.

IV. *Research* 10

It should be clear that you have thoroughly researched your topic, as evidenced by your understanding of how your project will work, and by your references.

V. *Peer Review* 5

This is credit you get for reviewing someone else's paper.

VI. *Draft* 15

This is based on my evaluation of your progress at the time of the draft.

VII. *Budget Justification* 5

List what is needed for the project. This should include all chemicals, but you need not list all of the basic glassware you need. Definitely list any instruments you will use.

*Make a separate list of things that need to be ordered – give sources, catalog numbers, and prices.*

**Topic Due:** *Monday, September 24<sup>th</sup>*

**Draft Due:** *Monday, Nov. 12<sup>th</sup>*

**Full Proposal Due:** *Friday, November 30<sup>th</sup>*

**Suggestions for projects:**

Feel free to be creative in choosing a project. The following ideas are meant as examples to give you an idea of the possibilities for projects. Be sure to select a project that you find interesting!

1. Test soil samples from different parts of a field or lot for nutrients to determine how to fertilize or what crops to plant.
2. Test urban soils for the presence of contaminants.
3. Is your apartment, dorm room, or house lead free? analyze paint or water samples.
4. Do you like to stay up all night? Analyze the amount of caffeine available in your favorite beverages. Compare different brands of coffee or soda.
5. Compare water quality from different sources. What's in the water you drink?
6. Compare different sampling or different sample preparation techniques for a given analysis. Which is more accurate/precise/sensitive? Which is more cost-effective? Which would you select if you were in business doing this particular analysis?
7. How much alcohol is in different bottles of wine or beer? How much glucose? salts? How do the results compare with the age or brand of the product?
8. Do "Premium" gasolines really have more octane than "Regular" grades? Are the stated amounts accurate?