

Biochemistry 704: Chemical Biology

• Research Proposal •

Half of your grade in Biochemistry 704 will be based on a written proposal describing an original research project in chemical biology—the use of ideas and methods of chemistry to solve problems in molecular and cell biology.

Proposal submission is to be carried out in two phases. First, outline the basis of your idea on 1 page or less. Submit that page to the course **on or before March 13th**. We will provide you with feedback on your idea immediately after Spring Break. Second, after your idea is approved, write the full proposal (5–10 pages; ~2000 words) and submit 3 identical copies **on or before April 15th**.

Use the following format to compose your full proposal.

Page 1: Cover page

List your name, research advisor's name, and the title of your proposal.

(*Note:* To keep the reviews anonymous, do not put your name or your research advisor's name on any other page in the proposal.)

Page 2: Abstract

List the Title, Overall Objective, and Specific Aims of the Proposal (but not your name).

Provide a single figure to convey the gist of the proposed research to others who have not read the full proposal. The figure could, for example, depict a key structure(s), reaction(s), or concept. You could adopt a figure from the body of the proposal (though that is not essential).

Page 3–...

Title

Overall Objective

In a few sentences, state the broad goal that the proposed research is intended to achieve.

Hypothesis

State the hypothesis to be tested and describe its significance. Keep in mind that a hypothesis is not a question for which there is already an answer. A scientific hypothesis should be a testable postulate and the testing of this postulate should result in *new scientific insight*.

Maximum credit will be given for a clearly-formulated hypothesis along with proposed experiments that provide an unambiguous test of that hypothesis.

Specific Aims

Define how the hypothesis is to be tested, dividing the overall objectives into Specific Aims. The Specific Aims are a list of items needed to achieve the long-term objectives. Understand the difference between broad, long-term objectives (*e.g.*, “understand chemical aspects of a particular biological phenomenon”) and Specific Aims (*e.g.*, “study the influence of ligand **L** on the function of protein **P** in a human cell”).

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Background and Significance

Briefly describe the scientific context for the proposed research. Critically evaluate relevant existing knowledge. Specifically identify gaps in knowledge that the proposed research will fill. Demonstrate understanding of the subject by justifying the need for the proposed research. State concisely the importance of the research by relating the specific aims to the overall objective—Why would the information be useful and what could be done with it?

Experimental Design and Methods

Outline the experimental design and procedures you will use to accomplish the Specific Aims of the project. The experimental approach should be outlined clearly and in sufficient detail that the plan can be evaluated. Do not, however, provide experimental protocols (*e.g.*, do not include detailed information such as “a 3-L culture of *Escherichia coli* will be treated with 25 mg of compound X”).

Number the experiments to correspond to those of the Specific Aims. Use figures to convey your ideas. Discuss control experiments and their interpretation. Provide an overview of how the data is to be collected, analyzed, and interpreted. Discuss potential difficulties and limitations, as well as alternatives to overcome problems.

References

Be thorough, relevant, and current. If you use a figure or table from another source, be sure to cite that source. Use a standard format for your references, and include the titles of journal articles.

What do I submit in April?

3 stapled copies of your full proposal, which will be distributed to the faculty and reviewers (who will not receive Page 1).

10 copies of Page 2, which will be distributed to the Study Section members.