

Supplement 2:
Considerations for Adapting Molecular Case Study Projects to Align with Specific Course Objectives

1. The overall goal of having students write a molecular case study should tie the concept of a structure-function relationship of biomolecules directly to your particular course goals. This affects the stated “overall project goal” and how the project aligns with your curricular objectives. A few examples are provided below.

Example 1 Course: 400-level advanced biochemistry elective focused on fermentation

Overall project goal: Make a clear link between the structure and function of a protein that plays a critical role in a fermentative pathway.

How does this project (authoring a molecular case study) fit in the fermentation course objectives?

Throughout this project, you will have the opportunity to...

- Apply foundational knowledge about protein identity, structure, and function to a protein of special interest to you
- Find and interpret primary biochemical literature related to your protein
- Study examples of how similar biochemical principles are applied to solve a diverse set of biochemical challenges relevant to industrial or in-home food production

Example 2 Course: 400-level introductory biochemistry laboratory course where students purify and characterize the enzyme Lactate Dehydrogenase (LDH)

Overall project goal: Make a clear link between the structure and function of LDH as a critical protein in a student chosen biological context.

How does this project (authoring a molecular case study) fit in with biochemistry curricular goals?

Through this project you will have the opportunity to:

- Apply foundational knowledge about protein identity, structure, and function to the protein (LDH) you have personally purified and characterized in the laboratory as it relates to a biological function of special interest to you.
- Find and interpret biochemical literature and/or data related to LDH.
- Study examples of how a variety of biochemical principles and techniques similar to the ones you used in the laboratory are applied to study a diverse set of biological questions.

2. The process of selecting a protein of interest and the type of protein that a student may select are both customizable. Consider one of three variations:
 - a. Assign all students the same protein as the subject of the study. You may provide a specific protein (i.e. everyone will write a case study about lactate dehydrogenase using PDB ID XXXX), or you may ask students to find any one of the structures of LDH from different organisms or with different cofactors. This may best suit the constraints of large classes or lower level courses.

- b. Allow students to select a protein within a defined functional scope (i.e. a transcription factor or a G-protein coupled receptor)
 - c. Allow students to select a protein with a specific type of domain or motif (i.e. a leucine zipper or a transmembrane domain-containing protein)
- 3. It is helpful to introduce molecular case studies as a writing genre before asking students to author them. Consider one of two variations:
 - a. Have students complete an entire molecular case study as part of the course.
 - b. Have students critique a molecular case study in a peer review-type assignment. Ask students to critically evaluate the alignment of the objectives with the course and critique what should be improved.
- 4. The formatting of the literature cited may fit with your stated course policies. If you do not have requirements, we suggest the use of the style of the *ACS journal Biochemistry* or *Cell*. If students are not yet comfortable finding and reading primary literature or general information literacy, they may benefit from meetings with librarians.
- 5. There are other ways you may supplement this exercise to tailor it to your course:
 - a. You could require students to include experimental data from previously completed experiments or published literature from class (examine a gel or other experimental data).
 - b. It may also be valuable to familiarize your students with the various bioinformatics data resources and visualization tools available online in a separate assignment - e.g., have them practice using these data, resources, and tools (either when doing the example cases or as separate worksheets prior to beginning this project).