MOL518 Spring 2026

Homework 1

Due: Friday February 6, 2026

- For this assignment, you will generate and then submit a jupyter notebook on canvas.
- You may use generative AI tools as per the syllabus unless otherwise stated in the problem.

First, make a new Jupyter notebook named `MOL518_HW1_<YourLastName>.ipynb`*. All problems will be answered in this notebook. For each problem, start with a Markdown cell using Problem XX as the title, i.e. "# Problem 1".*

Problem 1: Practice with Markdown

Figure 1 is the preface page for Lubert Stryer's classic textbook *Biochemistry*. Recreate this page in a Markdown cell in your notebook. The image at the bottom of the page is provided as `StryerPreface_liverketone.png`. *Do not use AI for this problem.*

PREFACE

The more we learn, the more we discover connections threading through our biochemical world. In writing the sixth edition, we have made every effort to present these connections in a way that will help first-time students of biochemistry understand the subject and how very relevant it is to their lives.

Emphasis on Physiological Relevance

Biochemistry is returning to its roots to renew the study of its role in physiology, with the tools of molecular biology and the information gained from gene sequencing in hand. In the sixth edition, we emphasize that an understanding of biochemical pathways is the underpinning for an understanding of physiological systems. Biochemical pathways make more sense to students when they understand how these pathways relate to the physiology of familiar activities such as digestion, respiration, and exercise. In this edition, particularly in the chapters on metabolism, we have taken several steps to ensure that students have a view of the bigger picture:

- Discussions of metabolic regulation emphasize the **everyday conditions** that determine regulation: exercise versus rest; fed versus fasting.
- New **pathway-integration figures** show how multiple pathways work together under a specific condition, such as during a fast.
- More **physiologically relevant examples** have been added throughout the book.

This physiological perspective is also evident in the new chapter on drug development. The use of a foreign compound to inhibit a specific enzyme sometimes has surprising physiological consequences that reveal new physiological principles.

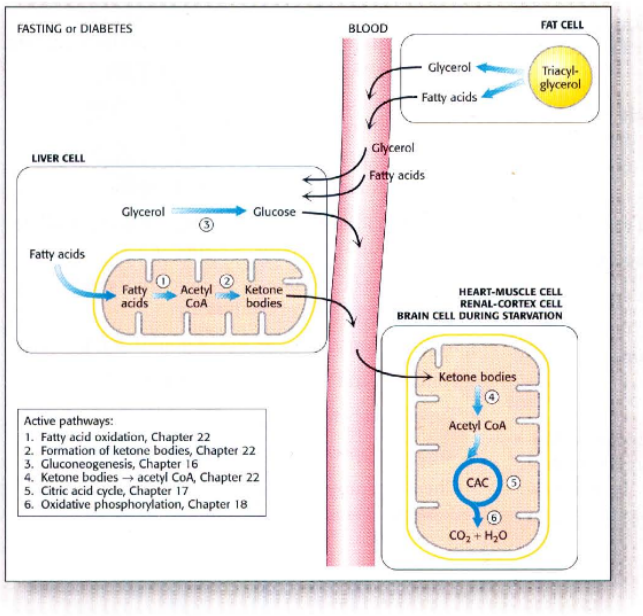

Figure 1: Stryer preface page.

Problem 3: NumPy Arrays (Indexing, Slicing, Shape)

(25 points)

a) Create a 1D NumPy array containing the odd integers from 1 to 21 (inclusive).

b) Print every 3rd element of that array (starting from the first element of the array).

c) How many elements remain if you remove every 3rd element? Show your reasoning and/or code.

d) Create the following 2D array as a NumPy array:

0	0	1	0	0
0	2	0	2	0
3	0	0	0	3
0	2	0	2	0
0	0	1	0	0

e) Print the 3rd row (be careful about Python indexing).

f) Compute the total number of elements in the array using its `.shape`.

g) Replace the last row with `[99, 99, 99, 99, 99]` and print the modified array.

Problem 4: Loading and Inspecting Data (CSV)

(25 points)

In Lecture 2 you loaded a growth curve CSV file into a NumPy array.

a) Load `Lecture_2/data/growth_curve1.csv` using `np.loadtxt(..., delimiter=",")`. Include the code you used.

b) Print the shape of the loaded array.

c) Print the first 5 rows and the last row.

d) Extract the time column and OD column into 1D arrays called `time` and `od`.

e) Compute the total duration of the experiment in hours.

Problem 5: Saving Derived Data

(15 points)

a) Create a normalized OD array `od_norm` by dividing all OD values by the first OD measurement.

b) Create a 2D array with time in hours and `od_norm` as columns.

c) Save the result as a new CSV file (do *not* overwrite the original). Name it `growth_curve1_hr_norm.csv` and place it alongside the original in the same `data/` directory.

Optional (Extra Credit): Two Files, Lists, and Change in OD

(+5 points)

Load both `growth_curve1.csv` and `growth_curve2.csv` using a Python list of filenames. For each dataset, compute the change in OD from the first to last time point. Print the two values.

Checklist before submitting:

- PDF compiles without errors.
- All questions answered and labeled.
- Code included where requested.
- Output/units reported where relevant.