

## Flipped IN-CLASS Lesson Plan Template

Topic or concept: **When digestion goes wrong: food intolerances (sensitivities)**  
(Anatomy and Physiology class, digestive system)

### Basic objectives for preparatory work:

Define digestion, nutrients, enzymes, and absorption

Describe how food is broken down both physically and chemically, and absorbed into the body

Distinguish the four types of macronutrients, and list which types are broken down by enzymes from the pancreas and which are broken down by enzymes in the lining of the small intestine

Define “food intolerance”

### Advanced objectives for classwork & after class work:

Analyze a food diary to diagnose a subject’s food sensitivity (which nutrient a person has trouble digesting)

Hypothesize on the cause(s) of food sensitivities

Design a treatment plan, with suggestions on dietary changes

NOTE THAT THIS IS A 50 MIN CLASS

	Time planned	Activity and rationale	Resources needed
Beginning of class period	5 mins	Clicker question – first time answered as an individual, second time discussed and then answered as a group (students are divided into groups of ~5 throughout the semester). This will help students review what they learned before coming to class.	Clicker or app

	Time planned	Activity and rationale	Resources needed
Middle of period	15 mins	Mini-lecture based on preparatory activities (digestion and absorption). Clarify misconceptions and offer new info.	Lecture skeleton notes and movies
Middle of period	20 mins	Group problem solving. Students are given a food diary to analyze, with the goal of diagnosing a patient and describing, in detail, how digestion has “gone wrong”. Every 5 min or so we will “check in” as a class, to keep everyone on track.	Problem sheet on “lactose intolerance (lack of lactase enzyme)”
End of period	10 mins	Mini-lecture: summarize and expand on activity.  Concluded by one minute paper	Lecture skeleton notes  Index card (one minute paper may also be written on skeleton notes)

### Flipped AFTER CLASS Work Plan Template

Advanced learning objective	Activity and rationale	Instructions to students
Explain how conditions like IBS or SIBO can damage the lining of the small intestine, and hypothesize how this interferes with digestion and causes temporary “food intolerances”	Homework packet (study guide). For each organ system I give my students a study guide to help them learn (interact with) the lecture material. Problems may involve coloring, labeling, matching, writing, multiple choice, etc. In this particular case, students would read a brief description of IBS and SIBO, summarize it in writing, and then hypothesize on how such conditions affect digestion. This will help them review what they have learned and apply that to a new situation.	Read “IBS and SIBO” (posted on Canvas), and then answer question x on your Study Guide.

## GUIDED PRACTICE

Class: BIOL 2010

Date assigned:

Date due: 11:59 PM, night before lecture

Time estimate to complete this assignment: 20 min

### Overview/Introduction: When digestion goes wrong: food intolerances

Digestion and absorption of nutrients is critical for maintaining homeostasis. During digestion, the food that you eat is broken down both physically and chemically, and then absorbed into the body through the lining of the small intestine. Once inside your body, nutrients are broken down even further by the process of cellular respiration to produce ATP, the energy source for all cells. Sometimes, however, nutrients are not broken down or absorbed properly, and this can cause discomfort as well as malnutrition and hormonal imbalances.

### Learning Objectives

Basic objectives

Define digestion, nutrients, enzymes, and absorption

Describe how food is broken down both physically and chemically, and absorbed into the body

Distinguish the four types of macronutrients, and list which types are broken down by enzymes from the pancreas and which are broken down by enzymes in the lining of the small intestine

Define “food intolerance”

Advanced objectives (for in-class activity)

Analyze a food diary to diagnose a subject’s food sensitivity (which nutrient a person has trouble digesting)

Hypothesize on the cause(s) of food sensitivities

Design a treatment plan, with suggestions on dietary changes

### Preparatory Activities and Resources:

1. INSTRUCTIONS. **Watch** “Recorded Video x: Digestion and Absorption” on Canvas, and fill in the appropriate blanks on your lecture notes (note: skeleton notes are filled in partially before and partially during class, so students will do this the entire semester and know how the process works). Then take the three question **quiz** (“Quiz x: Digestion and Absorption”), posted below the video on Canvas.
2. RESOURCES (all posted on Canvas)
  - Required.** “Recorded Video x: Digestion and Absorption” on Canvas
  - Optional. Crash Course: Digestive System (link to youtube video)
  - Optional. Additional reading: A&P Textbook pages x-x
  - Strongly suggested.** Study Guide problems: x-x

Please complete the video and quiz by 11:59 PM, night before lecture.

- Note: students do not turn in their skeleton points, but they do get credit for taking the short quiz based on the skeleton notes

## Questions?

Post your questions on the Canvas discussion board!

## ADVANCED PRACTICE

This is given for students to complete after the class meeting in which they work together.

Class: BIOL 2010

Date assigned:

Date due: handed in at 8 am during lecture, ~ 1 week after digestive system completed

Time estimate to complete this assignment: 5-10 min

## Learning Objectives

### Advanced objectives

Explain how conditions like IBS or SIBO can damage the lining of the small intestine, and hypothesize how this interferes with digestion and causes temporary “food intolerances”

## Activities & deliverables

1. INSTRUCTIONS. Read “IBS and SIBO” (posted on Canvas), and then answer question x on your **Study Guide**.
2. Note that Study guides are due ~1 week after an organ system is completed in class, and are turned in at the beginning of lecture... Students have so many different assignments for lecture and lab that I can't assign them both pre and post-lecture assignments for every lecture, so my compromise will be to assign 1-2 pre-lecture assignments per week, and then one post-lecture assignment per organ system (with multiple questions that they answer as they go along).

## Resources

Reading: “IBS and SIBO”

Optional: Interview with Dr. Pimental

Optional: IBS cookbook

## Questions?

Post your questions on the Canvas discussion board!