ASSIGNMENT 1

1. Giving two examples for each, define the following terms:
   1. Food: - Any nutritious substance that people or animals eat or drink or that plants absorb in order to maintain life and growth. The examples of food are meat and rice.
   2. Nutrients: - Nutrients are substance used by an organism to survive, grow, and reproduce. The requirement for dietary nutrient intake applies to animals, plants, fungi, and protists and its examples are food and protein.
   3. Nutrition: - Nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism, and excretion. Also, **Nutrition** is nourishment or energy that is obtained from food consumed or the process of consuming the proper amount of nourishment and energy. An example of **nutrition** is the **nutrients** found in fruits and vegetables and eating a healthy diet.
2. Distinguish between dispensable and indispensable nutrient

Dispensable nutrients are nutrients that are already been synthesized in the body and therefore can be provided by food only in small amounts. Whereas, indispensable nutrients are nutrients coming from the food we eat that are needed by the body to maintain life which includes carbs, proteins, fats, vitamins, minerals, and water. The difference between the two are the process in which they are obtained. With indispensable nutrients, the needed vitamins and minerals must be supplemented because they are not made naturally by the body. Dispensable nutrients get their name because many people don’t even have to think about them because processes in the body create them naturally.

1. Suggest a reason why protein deficiency/inadequacy would interfere with the process of digestion.

Proteins, vitamins and minerals are essential for maintaining proper body function. Alcohol can affect proper body functioning by causing nutrient deficiencies and by disrupting the "machinery" the body uses to metabolize nutrients.

If you do not have enough protein in your diet, your body is not able to properly maintain cell structure, because cells are composed mostly of protein.

If you [drink alcohol to excess](https://www.verywellmind.com/alcohol-how-much-is-too-much-67238), you can prevent the protein that you do eat from maintaining cell structure. Alcohol can affect protein nutrition in the following ways:

* Impairs digestion of proteins to amino acids
* Impairs processing of amino acids by the small intestine and liver
* Impairs synthesis of proteins from amino acids
* Impairs protein secretion by the liver

Alcohol inhibits the natural breakdown of nutrients in several ways:

* Decreasing secretion of [digestive enzymes](https://www.verywellfit.com/what-digestive-enzymes-do-to-food-2507053) from the pancreas.
* Impairing nutrient absorption by damaging the cells lining the stomach and intestines.
* Disabling transport of some nutrients into the blood.
* Preventing those nutrients that are absorbed from being fully utilized by altering their transport, storage and excretion.

If the person who is drinking to excess is also not eating well, their nutritional deficiencies alone can impair absorption of nutrients by altering the cells lining the small intestine.

1. Giving specific examples, explain what you understand by the term enzyme specificity.

**enzyme** **specificity***means that every enzyme is specified to perform its own specific function. like pepsin is specified for its function in stomach.*

One of the properties of [enzyme](https://en.wikipedia.org/wiki/Enzyme) that makes them so important as diagnostic and research tools is the specificity they exhibit relative to the reactions they [catalyze](https://en.wikipedia.org/wiki/Catalysis). A few enzymes exhibit absolute specificity; that is, they will catalyze only one particular reaction. Other enzymes will be specific for a particular type of [chemical bond](https://en.wikipedia.org/wiki/Chemical_bond) or [functional group](https://en.wikipedia.org/wiki/Functional_group). In general, there are four distinct types of specificity:

* Absolute specificity - the enzyme will catalyze only one reaction.
* Group specificity - the enzyme will act only on molecules that have specific functional groups, such as [amino](https://en.wikipedia.org/wiki/Amine), [phosphate](https://en.wikipedia.org/wiki/Phosphate) and methyl groups.
* Linkage specificity - the enzyme will act on a particular type of chemical bond regardless of the rest of the molecular structure.
* Stereo chemical specificity - the enzyme will act on a particular [steric](https://en.wikipedia.org/wiki/Stereoisomerism) or [optical isomer](https://en.wikipedia.org/wiki/Chirality_(chemistry)).

Though enzymes exhibit great degrees of specificity, [cofactors](https://en.wikipedia.org/wiki/Cofactor_(biochemistry)) may serve many [Apo enzymes](https://en.wikipedia.org/wiki/Enzyme). For example, [nicotinamide adenine dinucleotide](https://en.wikipedia.org/wiki/Nicotinamide_adenine_dinucleotide) (NAD) is a coenzyme for a great number of [dehydrogenase](https://en.wikipedia.org/wiki/Dehydrogenase) reactions in which it acts as a hydrogen acceptor. Among them are the [alcohol dehydrogenase](http://www.worthington-biochem.com/ADH/default.html), [malate dehydrogenase](http://www.worthington-biochem.com/MDH/default.html) and [lactate dehydrogenase](http://www.worthington-biochem.com/LDH/default.html) reactions.

1. Explain what you understand by the term antnutrients.

[Antinutrients](https://www.sciencedirect.com/topics/food-science/antinutrients) are natural or synthetic compounds that interfere with the absorption of nutrients. Examples include the following:

Protease inhibitors (e.g., Bowman–Birk [trypsin](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/trypsin) inhibitor in [soybeans](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/soybeans) ([Birk, 1985](https://www.sciencedirect.com/science/article/pii/B9780081005965034259" \l "bib5))), which inhibit trypsin, [pepsin](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/pepsin), and other [proteases](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/protease) in the gut, preventing digestion and absorption of proteins and amino acids

Lipase inhibitors (e.g., tetrahydrolipstatin), which interfere with enzymes, such as [lipases](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/lipase), which catalyze hydrolysis of some lipids and fats

Amylase inhibitors in beans, which prevent the action of enzymes that break the glycosidic bonds of starches and other complex carbohydrates, preventing the release of simple sugars and absorption by the body

Phytic acid in the [hulls](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/hulls) of nuts, seeds, and grains, which has a strong binding affinity for calcium, magnesium, iron, copper, and zinc, preventing their absorption

Oxalic acid and oxalates, which are present in many plants, particularly members of the spinach family, bind calcium to prevent its absorption

1. Explain three functions of bile in the digestion of lipids.

Bile is a complex fluid containing water, electrolytes and a battery of organic molecules including bile acids, cholesterol, phospholipids and bilirubin that flows through the biliary tract into the small intestine.

* Promotes exocrine lipid secretion especially cholesterol elimination. Cholesterol is eliminated through its conversion into bile acids, allowing the body to maintain cholesterol homeostasis. Bile acid sequestrants, medications intended to lower cholesterol, function by binding bile acids in the small intestine and increasing their excretion in the stool. Bilirubin is also eliminated through its secretion into bile where it eventually forms the dark pigment of feces.
* Facilitates dietary liquid absorption, obligatory for fat-soluble vitamin absorption. Through the process of emulsification, bile acids break down large lipid droplets into smaller ones, increasing the surface area for digestive enzymes. Emulsification is possible due to the amphipathic property of bile salts. The hydrophilic portion of the bile salts surrounds the lipid, forcing the lipid to disperse as the negative charges repel each other. Bile salts also allow the products of lipid digestion to be transported as micelles. The core of the micelle contains monoglycerides, lysolecithin, fatty acids, and the hydrophobic portion of the bile salt. The hydrophilic portion of the bile salt surrounds the lipid core, increasing solubility. Without bile salts, the fat-soluble vitamins (A, D, E, K) cannot be absorbed.
* Conduit endo-biotic and xenobiotic excretion. Once a substance has been excreted by the liver into the bile, and then into the intestinal tract, it can be eliminated from the body in the feces, or it may be reabsorbed. Since most of the substances excreted in the bile are water soluble, they are not likely to be reabsorbed as such. However, enzymes in the intestinal flora are capable of hydrolyzing some glucuronide and sulfate conjugates, which can release the less polar compounds that may then be reabsorbed. This process of excretion into the intestinal tract via the bile and reabsorption and return to the liver by the portal circulation is known as the enterohepatic circulation.
* Distributes immunoglobins and antioxidants throughout the gut

1. Explain how proteins differ structurally from carbohydrates and lipids.

## Proteins

The building blocks that make up proteins are called amino acids. Proteins consist of 20 different amino acids, mixed and matched to create a vast array of larger molecules that support every process in your body. Digestion of protein results in a pool of single amino acids that your cells incorporate into new proteins as the need arises in your body. These molecules make up muscles and organs, transmit signals between cells, constitute immune molecules, help create the new proteins your tissues require and can serve as a fuel source in a pinch. Proteins have polar C=O and N-H groups, so they are able to form hydrogen bonds with other molecules and with each other.

## Carbohydrates

Carbohydrates consist of single-sugar units called monosaccharides, double-monosaccharide units known as disaccharides and multiple-monosaccharide molecules that make up starches. The predominant purpose of the carbohydrates you eat is to provide fuel to your cells. Disaccharides and starches undergo digestion to reduce them to their individual sugars, and, once absorbed, they travel to the cells and tissues throughout your body to power your physical activities. A special type of carbohydrate, known as fiber, passes through your gut undigested. While fiber doesn’t provide you with cellular energy, it improves your digestive health by regulating your bowel function.

Carbohydrates have many polar OH groups. A typical carbohydrate is starch, which is consists of many glucose units (C6H12O6) joined together. Most carbohydrates are **hydrophilic** and soluble in water because of their polar OH groups.

## Lipids

Unlike the other macromolecules, lipids are not soluble in water, and they don’t form long sequences made up of similar or repeating smaller units. The fats you consume are molecules called triglycerides, consisting of three fatty acids attached to a glycerol. The chemical nature of the fatty acids contained within the lipid determines its physical characteristics. For instance, a fatty acid that is saturated with as many hydrogen atoms as it can hold is solid at room temperature, while unsaturated fatty acids are liquid. These macromolecules store energy within fat tissue, and they cushion your internal organs against trauma. They also form the structure of cell membranes and contribute to the synthesis of hormones.

Lipids are **hydrophobic** and insoluble in water.

They have varied structures, but all have a polar head and a large nonpolar tail.

Fats and oils are typical lipids. The molecule is mostly nonpolar hydrocarbon with some polar C=O groups at one end.

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