What is Nutrition?

○ *Nutrition: the study of food, including*
  ○ *How food nourishes our bodies*
  ○ *How food influences our health*

○ *Nutrition is a relatively new discipline of science.*

Why is Nutrition Important?

○ *Nutrition contributes to wellness.*

○ *Wellness: the absence of disease*
  ○ *Physical, emotional, and spiritual health*

○ *Critical components of wellness:*
  ○ *Nutrition*
  ○ *Physical activity*

Why is Nutrition Important?
- Nutrition can prevent disease.
  - Nutrient deficiency diseases
    a. Scurvy
      - Vitamin C deficiency which causes general weakness, anemia, gum disease, and skin hemorrhages.
    a. Goiter
      - Iodine deficiency which causes an enlargement of the thyroid gland
    a. Rickets
      - Deficiencies of vitamin D, calcium, or phosphate which leads to softening & weakening of the bones
  - Diseases influenced by nutrition: chronic diseases such as heart disease
  - Diseases in which nutrition plays a role: osteoarthritis, osteoporosis

Nutrition is the biochemical and physiological process by which an organism uses food to support its life. It includes ingestion, digestion, absorption, transport, assimilation, and excretion. The science that studies the physiological process of nutrition is called nutritional science.

Nutrition is about eating a healthy and balanced diet. Food and drink provide the energy and nutrients you need to be healthy. Understanding these nutrition terms may make it easier for you to make better food choices.

Nutrients

Nutrients are substances used by an organism to survive, grow, and reproduce. The seven major classes of relevant nutrients for animals (including humans) are carbohydrates, dietary fiber, fats, proteins, minerals, vitamins, and water. Nutrients can be grouped as either macronutrients (carbohydrates, dietary fiber, fats, proteins, and water needed in gram quantities) or micronutrients (vitamins and minerals needed in milligram or microgram quantities).

Diet

In nutrition, the diet of an organism is the sum of foods it eats, which is largely determined by the availability and palatability of foods.

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese. The issue has grown to epidemic proportions, with over 4 million people dying each year as a result of being overweight or obese in 2017 according to the global burden of disease.

Body Mass Index (BMI)

- A calculation that measures weight in relation to height and correlates this with body fat
  - Ideal range is 18.5 – 24.9
  - <18.5 = underweight
  - 25 – 29.9 overweight
  - >30 obese

Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women.

Body mass index (BMI) is a value derived from the mass (weight) and height of a person. The BMI is defined as the body mass divided by the square of the body height, and is expressed in units of kg/m^2, resulting from mass in kilograms and height in metres.

The BMI is a convenient rule of thumb used to broadly categorize a person as underweight, normal weight, overweight, or obese based on tissue mass (muscle, fat, and bone) and height. Major adult BMI classifications are underweight (under 18.5 kg/m2), normal weight (18.5 to 24.9), overweight (25 to 29.9), and obese (30 or more). When used to predict an individual's health, rather than as a statistical measurement for groups, the BMI has limitations that can make it less useful than some of the alternatives, especially when applied to individuals with abdominal obesity, short stature, or unusually high muscle mass.

The BMI is universally expressed in kg/m^2, resulting from mass in kilograms and height in metres. If pounds and inches are used, a conversion factor of 703 (kg/m^2)/(lb/in^2) must be applied. When the term BMI is used informally, the units are usually omitted.

$$\text{BMI} = \frac{\text{mass}_{kg}}{\text{height}_m^2} = \frac{\text{mass}_{lb}}{\text{height}_{in}^2} \times 703$$
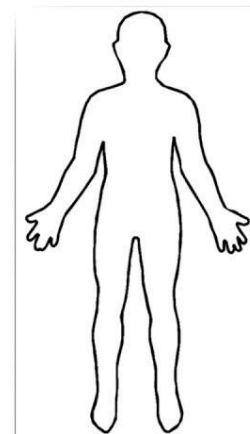
BMI provides a simple numeric measure of a person's thickness or thinness, allowing health professionals to discuss weight problems more objectively with their patients. BMI was designed to be used as a simple means of classifying average sedentary (physically inactive) populations, with an average body composition. For such individuals, the value recommendations as of 2014 are as follows: a BMI from 18.5 to 24.9 kg/m2 may indicate optimal weight, a BMI lower than 18.5 suggests the person is underweight, a number from 25 to 29.9 may indicate the person is overweight, and a number from 30 upwards suggests the person is obese. Lean male athletes often have a high muscle-to-fat ratio and therefore a BMI that is misleadingly high relative to their body-fat percentage.

What Are Nutrients?

- **Nutrients**
  - *The chemicals in foods that are critical to human growth and function.*
- **Essential Nutrients** *are critical to the body for the body to function properly:*

carbohydrates	vitamins
fats and oils	minerals
proteins	water

Essential Nutrients

- Carbohydrates
- Vitamins
- Fats and oils
- Minerals
- Proteins
- Water

Carbohydrates

Carbohydrates, or "carbs," provide you with two main things: Energy for your body and fuel for your brain. There are three types of carbohydrates: sugars, starches, and fiber.

Carbohydrates are central to nutrition and are found in a wide variety of natural and processed foods. Starch is a polysaccharide. It is abundant in cereals (wheat, maize, rice), potatoes, and processed food based on cereal flour, such as bread, pizza or pasta. Sugars appear in human diet mainly as table sugar (sucrose, extracted from sugarcane or sugar beets), lactose (abundant in milk), glucose and fructose, both of which occur naturally in honey, many fruits, and some vegetables. Table sugar, milk, or honey are often added to drinks and many prepared foods such as jam, biscuits and cakes.

Sugars

Sugars – Some come naturally in foods, like apples, and some have added sugars, like chocolates. Either way, you body can't tell the difference between the two types. It treats all sugars basically the same way. View the chart below for types of common sugars.

COMMON SUGARS	
Sucrose	The same thing as table sugar. Sucrose comes from plants such as beets, sugar cane, and corn.
Lactose	The main sugar in milk. Some people have trouble digesting Lactose, which is known as lactose intolerance.
Fructose	The sweetest of all sugars. It occurs naturally in fruits and honey. It is commonly added to foods, in the form of high-fructose corn syrup (HFCS).
Glucose	Found in the blood, so it's often called blood sugar. Glucose is the main source form of carbohydrate that cells use to produce energy. Glucose is present in some foods such as fruits, vegetables, corn syrup, and honey.
Others	When you look at ingredients on a food label, you'll find all kinds of terms referring to sugars. A food is likely to be high in sugars if one of these names appears first or second on the ingredient list

Empty Calorie Foods Empty calories are calories from foods that contain very few healthy nutrients. These foods typically contain a lot of sugar. View the chart below for examples of common empty calorie foods.

COMMON EMPTY CALORIE FOODS	
Food	**Added Sugar (approx.)**
Candy (1 oz)	5 tbs
Cake, frosted (1/16 of 9' cake)	8 tbs
Cookies, commercial (4-5)	5 tbs
Doughnut, yeast, glazed (1)	5 tbs
Fruit punch (8 oz)	6 tbs
Fruit rolls (1 roll)	3 tbs
Granola bar (1 bar)	4 tbs
Lemonade (8 oz)	6 tbs
Pastry, pan dolce (1)	5 tbs
Fruit pie (1/16 of 9' pie)	5 tbs
Popcorn, caramelized (1 cup)	5 tbs
Popsicle (1)	4 tbs
Sherbet (1/2 cup)	7 tbs
Soft drinks (12 oz)	9 tbs
Sweetened fruit drinks (12 oz)	12 tbs

Starches

Another type of carbohydrate is starch. When you think starches, think of grains such as wheat, rice, corn, and oats, also legumes, dry beans, peas and starchy veggies such as and potatoes and yams. High-starch foods usually have more vitamins, minerals, and fiber than high-sugar foods.

Hidden Starches

• Less obvious.

• These starches are added to foods during cooking.

• Some examples are adding flour to gravy to thicken it, and breading on meats and poultry, such as fried chicken or nuggets.

Fiber

The final type of carbohydrate is fiber. Our bodies don't have the enzymes needed to break fiber down into smaller units for absorption. This means fiber cannot be used for energy. There are two types of fiber:

Insoluble Fiber (or roughage)

• Doesn't dissolve in water, but it does absorb water.

• Creating bulkier, softer stool makes it easier for your small intestine and colon to push waste through.

• This extra bulk reduces constipation and may help prevent diseases, such as colorectal cancer.

• Whole-wheat flour, wheat bran, nuts and many vegetables are good sources of insoluble fiber.

* Whole grains are a good source of fiber. A whole grain is the entire edible portion of a grain. A whole seed contains three parts: the endosperm, the bran and the germ. When whole grains are made into flour, only the endosperm remains, removing most of the fiber, along with much of the protein, vitamins, and minerals. If a grain is "enriched," it means that iron, thiamin, riboflavin, and niacin were added back to the grain. However, other nutrients that were lost, such as magnesium, vitamin B6, zinc, vitamin E, and fiber, are not restored, sole grain breads and cereals have more fiber, vitamins, and minerals than enriched or refined products.

Soluble Fiber

• Soluble fiber dissolves in water to form a gel-like, gummy material

• It can help lower blood cholesterol and glucose levels.

• Soluble fiber is found in oats, peas, beans, apples, citrus fruits, carrots, and barley.

HEALTH BENEFITS OF FIBER	
Problem	**Possible Health Benefit of Increasing Fiber Intake**
Constipation	Fiber holds water, which increases bulk of stool, producing softer stools and reducing constipation.
Hemorrhoids	Larger, softer stools reduce straining during bowel movements.
Diverticulosis	Larger, softer bowel movements maintain the health of the colon to prevent formation of tiny sacs that may become infected.
Obesity	Increased feeling of fullness from high-fiber food, resulting in less food eaten.
Heart Disease	Eating certain kinds of fiber reduces heart disease risk.
Colorectal Cancer	Large, soft stools may dilute carcinogens: faster time through colon reduces contact of carcinogen with intestinal wall.

Increasing Fiber Intake

• Not quite sure how to increase fiber in your diet? Use these strategies:

• Eat a variety of plant-based foods.

• Eat plenty of fruits and vegetables.

• Look for 'bran', 'whole grain', or 'whole wheat flour' on food labels.

• Choose whole grains for at least half of your grain.

• Eat beans and legumes often.

• Choose cereals with 5 or more grams of dietary fiber per serving.

• Eat brown rice rather than white rice.

• Leave the skins on your fruit and vegetables.

• Choose whole fruit over juice.

• Substitute higher fiber ingredients in cooking (such as adding bran or oatmeal).

Fats

Another major class of nutrients found in foods is fat.

• Fats have more calories than carbohydrates and proteins, and eating large amounts of fat can lead to weight gain and obesity.

• Our bodies need fat to carry out certain essential functions, such as the absorption of vitamins A, D, E, and K.

• Fats are also what give our food its flavor, aroma, and texture and make us feel full.

• Eating too much of certain types of fat can lead to clogged arteries, heart disease, and other chronic diseases.

• Fats come in three types: saturated, unsaturated (monounsaturated and polyunsaturated), and trans fats.

Saturated Fats

• Saturated fats are the least healthy and can raise cholesterol levels in the blood.

• They are typically solid at room temperature.

• Usually come from animal sources, like meat, milk, cheese, butter, egg yolks, and cream.

FOODS HIGH IN SATURATED FATS	
Animal Sources	**Plant Sources**
Certain cuts of beef and pork	Coconut oil
Chicken and turkey skins	Palm kernel oil
Whole-milk dairy products	Palm oil
Butter	Cocoa butter
Lard	Chocolate
	Some hydrogenated shortenings

Unsaturated Fats

• Unsaturated fats are usually liquid at room temperature.

• They almost always come from plant sources.

• Unsaturated fats can be either monounsaturated or polyunsaturated.

MONO AND POLYUNSATURATED FAT	
Polyunsaturated	**Monounsaturated**
Safflower oil	Canola oil
Sunflower oil	Olive oil
Corn oil	Peanut butter
Soybean oil	Avocado
Fatty seafood	Nuts

• Omega-3 fats are polyunsaturated fats.

• Health benefits include: reducing the risk of cardiovascular disease and their role in brain and eye development in infants.

• Main sources of Omega-3s are cold water fish, like albacore tuna,mackerel and salmon.

• Flaxseed, soybean, and canola oils and walnuts are also high in Omega-3s.

Trans Fats

• Trans fat, should be limited or avoided as it increases the risk of cardiovascular disease.

• Trans fats are often found in fried items, like french fries, and baked goods, like cookies and crackers.

Recommendations for Fat in Your Diet

For those over two years of age:

• Limit the total fat you eat to 20-35 percent of your total calories

• Most fat should come from foods high in polyunsaturated and monounsaturated fats, and finally,

• Limit saturated and trans fats in your diet.

TO KEEP FAT AT AN ACCEPTABLE LEVEL:	
Use lean meats (removing visible fat) and skim or low-fat dairy products.	Bake, broil, steam, and grill, rather than frying
Use liquid unsaturated vegetable oils, like olive oil or canola for cooking instead of lard or shortening.	Eat plenty of fruits, vegetables, and whole grains, the foods naturally low in total fat and high in starch and fiber.
Enjoy fish or beans as a main dish.	Limit egg yolks.
Watch portion sizes. Consume high fat foods in moderation.	Add flavor using herbs and spices instead of fat.

Cholesterol

• Waxy, fat-like substance found in every cell in your body.

• Cholesterol is not fat; it has a different chemical structure and performs different functions in the body than fat.

• It isn't necessary to get cholesterol in your diet, because your liver makes it if you don't eat foods containing it.

• Blood Cholesterol - made by your liver

• Dietary Cholesterol - cholesterol from food is called dietary cholesterol.

Cholesterol Functions
 Just like oil and water, cholesterol and blood don't mix. To help cholesterol move through your blood, it's coated with a layer of protein, called a lipoprotein.
• Low-density lipoproteins (LDLs).

• High- density lipoproteins (HDLs).

• Both are made only in the body and are not found in foods. LDL carries most of your blood cholesterol to cells where it is used.

• If too much LDL cholesterol is in the blood, it can start to build up on the walls of your arteries, increasing your risk for heart disease.

• We call LDL cholesterol 'bad' cholesterol because of its potential to increase the risk of heart disease.

HDL, on the other hand, helps remove cholesterol from the blood and prevent

fatty buildup.

• This reduces your risk of heart disease, which is why it's called 'good' cholesterol.

• You can remember that HDL is the good cholesterol by thinking of the 'H' as 'hero.'

Dietary Cholesterol

• Dietary cholesterol is found only in foods from animals.

• High-fat foods like nuts, peanut butter, vegetable oil, and avocados contain fat, but they don't contain cholesterol because they come from plants, not animals.

• Too much dietary cholesterol can raise blood cholesterol levels, increasing risk for heart disease.

• You don't need to stop eating foods containing cholesterol, but just be aware of how much total cholesterol you're taking in. Click the chart to compare cholesterol amounts in foods.

HIGH CHOLESTEROL FOODS		
Food	Cholesterol (mg)	Saturated Fats (g)
Liver (3 ounces, cooked)	331	1.9
Egg (1 yolk)	213	1.6
Beef (3 ounces, cooked)	76	7
Whole milk (1 cup)	33	5.6
Cheddar cheese (1 ounce)	30	6
Bacon (3 medium slices)	16	3.3
Lard (1 tbsp.)	12	5
Skim milk (1 cup)	4	0

Proteins

In addition to carbohydrates and fats, another major class of nutrients found in foods is protein. Proteins are made up of amino acids; when amino acids are put together in different combinations, they make up the thousands of different proteins in the body.

Proteins perform all sorts of functions, such as:

• Build and maintain body tissue.

• Part of enzymes and hormones.

• Repair cells.

• Help transport nutrients and oxygen through the body.

• Provide energy when there are not enough carbohydrates and fats available.

Who needs more protein?

• We need more protein during periods of rapid growth.

• Children, as well as pregnant and breastfeeding moms, need more protein in their diets.

• Foods that come from both plants and animals contain protein.

PROTEIN IN FOODS	
Food	Protein (g = grams)
Dairy (8 oz. milk, 1-1/ 2 oz. cheese)	8g
Meat (1 oz. meat/poultry, 1/2 cup legumes)	7g
Grains (1 slice bread, 1 portion cereal)	3g
Vegetables (1/ 2 cup cooked, 1 cup raw)	2g
Fruits	0g

□ **Nutritional Importance of Proteins:**

These amino acids are used in the synthesis of different tissues and enzymes. If you are eating an extra amount of proteins, then the body can react in two ways:

1) Either the excess protein is broken down and used as an energy source.
2) or it will convert into acetyl coA which is used in fat synthesis(so we can conclude that excessive amounts of protein are stored as FAT.)

☐ Types of proteins:

1-Essential amino acids :

• Body can't synthesize, must be supplied in the diet

• PVT TIM HALL: Pheylalanine, Valine, Tryptophan, Threonine, Isoleucine, Methionine, Histidine, Arginine, Lysine, Leucine. "you should memorize them"

2-Non-essential amino acids: Body can synthesize them.

☐ Sources and RDA:

- Sources: Meat, poultry, fish, milk, wheat, corn, beans, nuts

- RDA "Recommended dietary intake" (gms/kg body weight)

• Normal adults: 0.8

• Athletes: 1.0

• Pregnancy / lactation: upto 30

• Children: 2.0

Vitamins

Vitamins are essential nutrients that your body needs in very small amounts. All of the vitamins that our bodies need can be found in the different types of foods we eat.

Vitamin supplements can be taken when it is not possible to consume enough of one or more of these essential vitamins in the typical diet.

• Partner with other nutrients to build, maintain and repair our body tissue and regulate body processes.

• Vitamins don't provide energy themselves, but they do help you get energy from carbohydrates, fats, and proteins.

• 13 essential vitamins your body needs to remain healthy.

Two Categories of Vitamins

Fat Soluble

• Dissolve in fat, not water, and then are stored in your body.

• They include vitamins A, D, E and K.

• Fat soluble vitamins are stored in your body and consuming too much can have toxic effects.

Water Soluble

• Dissolve in water and are not stored in significant amounts in your body.

• Water-soluble vitamins include: vitamin C and eight B-complex vitamins.

Vitamin Supplements

A well-balanced and varied diet provides all the vitamins most people need to stay healthy. However, there are reasons to take vitamin supplements such as:

• During rapid growth in infants and teens.

• Stress to the body.

• Pregnancy or breastfeeding.

• Those recovering from illness.

• Those on a weight-loss diet.

• In Oregon, where sunshine is not a dependable source for our bodies to make vitamin D so use of a supplement is recommended.

* Again, always remember, nutrition experts believe supplements should never replace a healthy diet.

Vitamin A

• Helps your body resist infection.

• Keeps the eyes, skin, and internal organs healthy.

VITAMIN A FOODS	
Food	**Serving Size**
Sweet potato, cooked	1 medium (5 in. long)
Carrot, raw	1 medium (6 in. long)
Spinach, cooked	1/2 cup cooked
Cantaloupe	1 cup cubes
Mango	1/2 medium
Winter squash, cooked	1/2 cup cubes
Spinach, raw	1 1/2 cups
Red bell pepper, raw	1/2 cup sliced
Vegetable juice, canned	6 oz.

Vitamin C

• Also known as ascorbic acid or ascorbate.

• Helps your body resist infection.

• Increases iron absorption, helps heal wounds.

• Gives structure to blood vessels.

• Helps mend broken bones.

HOW TO GET THE MOST VITAMIN C IN FOODS
• Avoid soaking vegetables in water.
• Steam vegetables or cook them in small amounts of water for a short time.
• Cook potatoes in their skins.
• Cover and refrigerate juices.
• When choosing produce, choose items that are freshest
• Grow your own fruits and vegetables
• Choose either fresh produce that is in season or frozen produce.

Folic Acid

• Also called folate.

• Helps your body make new cells.

• Helps form hemoglobin.

• Protects against heart disease.

• Reduces the risk of neural tube birth defects.

FOLIC ACID-RICH FOODS	
Food	Serving Size
Lentils	1/ 2 cup
Pinto beans	1/ 2 cup
Garbanzo beans	1/2 cup
Black beans	1/2 cup
Spinach	1/ 2 cup cooked
Asparagus	1/ 2 cup
Orange juice	1 cup from frozen conc.
Romaine lettuce	1 cup shredded
Sunflower seeds	1/ 4 cup

Antioxidants

Antioxidants are vitamins and minerals in foods that prevent damage or repair damage to body cells

• Essentially they "take the hit" to protect healthy cells.

• Antioxidants improve your immune function.

• May lower risk of infection and cancer.