Component I: Core

Module B: Terminology, Anatomy and Physiology

Topic 10: Digestive System

Statement of Purpose
To prepare the learner with basic knowledge of the digestive system.

Student Learning Outcomes
Upon completion of this topic, the learner will be able to:

1. Spell and define key terms.
2. Label major structures of the digestive system on an anatomical illustration.
3. List the characteristics and functions of the major portions of the digestive system.
4. Name the phases of the digestive process.
5. Discuss the functions of the accessory digestive organs.
6. Describe absorption of nutrients.

Terminology

1. Acids
2. Absorption
3. Ascending colon
4. Anus
5. Appendix
6. Alkaline enzymes
7. Bile
8. Bowel
9. Bolus
10. Cecum
11. Chyme
12. Chewing
13. Colon
14. Descending colon
15. Digestion
16. Duodenum
17. Elimination
18. Enzymes
19. Excretion
20. Esophagus
21. Feces
22. Gallbladder
23. Glycogen
24. Hydrochloric acid
25. Ileum
26. Jejunum
27. Large intestine
28. Lingual frenulum
29. Liver
30. Mandibular
31. Mouth
32. Mucosa
33. Palate
34. Pancreas
35. Pancreatic juices
36. Parotid glands
37. Peristalsis
38. Rectum
39. Saliva
40. Secretions
41. Sigmoid colon
42. Small intestine
43. Squamous
44. Stomach
45. Stool
46. Sublingual glands
47. Submandibular glands
48. Swallowing
49. Transverse colon
50. Uvula
51. Villi

References

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Websites

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5. www.lung.org/associations/states/california/
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7. http://kidshealth.org/parent/general/body_basics/kidneys_urinary.html

Content Outline/Theory Objectives	Suggested Learning Activities
Objective 1 **Spell and define key terms.** A. Review the terms listed in the terminology section. B. Spell the listed terms accurately. C. Pronounce the terms correctly. D. Use the terms in their proper contexts.	A. Games: word searches, crossword puzzles, Family Feud, Jeopardy, bingo, spelling bee, hangman and concentration. B. Administer vocabulary pre-test and post-test. C. Discuss learning gaps and plan for applying vocabulary.
Objective 2 **Label major structures of the digestive system on an anatomical illustration.** A. Mouth breaks food down mechanically and chemical digestion begins. B. Pharynx is the passage way for food, liquid and air. C. Epiglottis is the trap door that closes off airway when swallowing. D. Esophagus is the tube from mouth to stomach. E. Stomach is a J-shaped sac that mixes and stores food 1. Fundus, uppermost domed portion of the stomach. 2. Body, central portion of the stomach. 3. Antrum, lower portion of the stomach. 4. Pylorus, lower part of the stomach that connects to the small intestine. F. Small intestine 1. Main site for absorption. 2. Divided into 3 sections a. Duodenum. b. Jejunum. c. Ileum. G. Pancreas 1. Produces alkaline enzyme rich secretions. 2. Produces insulin. H. Liver secretes bile to aid in digesting fat. I. Gallbladder stores bile until needed. J. Large Intestine 1. Absorbs excess water. 2. Divided into 6 sections a. Cecum (appendix is attached to cecum). b. Ascending colon. c. Transverse colon. d. Descending colon. e. Sigmoid colon. f. Rectum. K. Anus, opening for rectum.	A. Lecture/Discussion B. Assigned Readings C. Use anatomical diagrams/ posters/videos/computer assisted learning/workbook activities.

Objective 3 **List the characteristics and functions of the major portions of the digestive system.** A. Digestion is the mechanical and chemical breakdown of foods into forms that body cells can absorb. B. The organs of the digestive system carry out digestion and can be divided into two categories 1. Alimentary canal. 2. Accessory organs. C. The alimentary canal 1. The wall of the alimentary canal consists of four layers a. Mucosa – innermost layer of wall made of epithelial tissue. Secretes enzymes and mucus into the lumen of the canal. b. Submucosa – layer just below the mucosa. It contains loose connective tissue, blood vessels, glands, and nerves. The blood vessels in this layer carry away absorbed nutrients. c. Muscular layers – this layer is just outside the submucosa. It is made of layers of smooth muscle tissue and contracts to move materials through the canal. d. Serosa – outermost layer, also known as the visceral peritoneum. It secretes serous fluid to keep the outside of the canal moist and to prevent it from sticking to other organs. 2. Smooth muscle in the wall of the canal can contract to produce two types of movements a. Churning which mixes substances in the canal. b. Peristalsis propels substances through the tract. D. Mouth 1. Saliva contains enzymes that break down carbohydrates. 2. Cheeks consist of skin, adipose tissue, skeletal muscles and an inner lining of moist stratified squamous epithelium. 3. Tongue, mostly skeletal muscles and an inner lining of moist stratified squamous epithelium a. Mixes food in the mouth and holds the food between teeth. b. Body of the tongue is held to the floor of the oral cavity by a flap of mucous membrane called the lingual frenulum. 4. Palate is the roof of the mouth. a. Separates oral cavity from the nasal cavity.	A. Lecture/Discussion B. Assigned Readings C. Use anatomical diagrams/ posters/videos/computer assisted learning/ workbook activities. D. Discuss these questions with class. 1. Gall bladder discussion a. What is the function of the gallbladder? b. How does the gall bladder empty bile into the small intestine? 2. Liver discussion a. Where is the liver located? b. What is the function of the liver? 3. Small intestine discussion a. What substances are normally digested in the small intestine? b. What substances are normally absorbed through the wall of the small intestine? 4. Mouth discussion a. What are the functions of the mouth? b. What happens to food when chewed? 5. Stomach discussion a. What functions of the stomach serve in digestion? b. Why does the acid in the stomach not eat the lining of the stomach? c. What happens if there is not enough acid in the stomach? 6. Appendix discussion a. What are the functions of the appendix? b. Where is it located? c. Why can a person live without the appendix?

b. The front is hard and rigid because it has bony plates in it. c. Back of palate is soft because it lacks bony material. d. There is a place on the palate that hangs down called the uvula. 5. Uvula acts to keep food and liquids from entering the nose during swallowing. 6. Teeth reduce size of food particles. 7. Salivary glands secrete saliva which is a mixture of water, enzymes and mucus a. Parotid glands, largest of the salivary glands, located beneath the skin just in front of the ears. b. Submandibular glands, located in the floor of the mouth just inside the surface of the mandible (lower jaw). c. Sublingual glands, smallest of salivary glands, located in the floor of the mouth beneath the tongue. E. Stomach 1. Lies below the diaphragm in the upper left region of the abdominal cavity. 2. Mixes food with gastric juices. 3. Starts protein digestion. 4. Moves food to the small intestine. 5. Extremely acidic. 6. Top of stomach has an opening with a muscle called the lower esophageal sphincter that allows food to enter and then remain within the stomach. 7. Bottom of stomach has a muscle called the pyloric sphincter that keeps food from entering the small intestine before it is ready for digestion. 8. Walls of stomach contain a. Mucus cells- secrete mucus to protect the lining of the stomach wall. b. Chief cells – secrete pepsinogen which becomes pepsin in the presence of acid which then digests protein. c. Parietal cells - secrete hydrochloric acid to convert pepsinogen to pepsin. In addition, secretes the intrinsic factor, necessary for vitamin B12 absorption. d. Parasympathetics and the hormone gastrin - stimulates the gastric glands to secrete their products. F. Small Intestine 1. Fills most of the abdominal cavity and carries out most of the digestive process 2. Duodenum – C-shaped and relatively short. 3. Jejunum – middle portion of the small intestine	

that is coiled and forms the majority of the small intestine. 4. Ileum – directly attached to the large intestine. 5. Lining of small intestine contains cells with microvilli, allowing a greater surface to absorb nutrients. 6. Walls of small intestine secrete water and mucus that aid digestion. G. Liver 1. Fills most of the upper right quadrant of abdomen 2. Production of bile, which helps carry away waste and break down fats in the small intestine during digestion. 3. Production of certain proteins for blood plasma. 4. Production of cholesterol and special proteins to help carry fats through the body. 5. Conversion of excess glucose into glycogen for storage (glycogen can later be converted back to glucose for energy). 6. Regulation of blood levels of amino acids, which form the building blocks of proteins. 7. Processing of hemoglobin for use of its iron content (the liver stores iron). 8. Conversion of poisonous ammonia to urea (urea is an end product of protein metabolism and is excreted in the urine). 9. Clearing the blood of drugs and other poisonous substances. 10. Regulating blood clotting. 11. Resisting infections by producing immune factors and removing bacteria from the bloodstream. H. Gallbladder 1. Small sac located below the liver 2. Stores and concentrates bile. 3. Bile leaves through the cystic duct and travels to the small intestine. 4. Bile breaks down fat.	
Objective 4 **Name the phases of the digestive process.** A. Chewing 1. Mixes food with saliva in the mouth. 2. Breaks down food to a substance called bolus. B. Swallowing is accomplished by muscular action called peristalsis. C. Digestion 1. Stomach muscles contract, further breaking down the bolus. 2. Strong stomach acids such as hydrochloric acid also break down the bolus. 3. Bolus now turned into chyme.	A. Lecture/Discussion B. Assigned Readings C. Use anatomical diagrams/ posters/videos/computer assisted learning/workbook activities.

D. Absorption 1. Occurs in small intestine. 2. Absorption of nutrients from chyme. E. Elimination 1. Occurs in large intestine or bowel. 2. Absorbs excess liquid from chyme. 3. Fibrous waste products are formed into semisolid feces or stool to be eliminated through the rectum.	
Objective 5 **Discuss the functions of the accessory digestive organs.** A. Aid in the process of digestion by contributing enzymes and acids 1. Bile. 2. Glycogen. 3. Pancreatic juice. B. Villi project from lining of small intestine 1. They move in a sweeping like motion to keep the chyme moving. 2. They absorb nutrients into bloodstream.	A. Lecture/Discussion B. Assigned Readings C. Use anatomical diagrams/ posters/videos/computer assisted learning/workbook activities.
b. Polysaccharides are starches like pasta, potatoes, rice, breads c. Monosaccharides are simple sugars like cookies, cake, sodas. 1) Used to make ATP for the muscles. 2) Excess can be stored in the liver as glycogen. d. Disaccharides, simple sugars. e. Cellulose is found in many vegetables, difficult to digest. 2. Proteins-end product of digestion are amino acids a. Includes meats, eggs, milk, fish, chicken, turkey, nuts, beans, cheese. b. Protein is a health requirement. c. Essential amino acids are necessary because the body cannot make them but requires them for growth and repair of tissues. 3. Lipids- end product of digestion fatty acids a. Fats obtained through various foods. b. Triglycerides – most abundant, found in eggs, meat, milk and butter. c. Cholesterol – dietary lipid found in dairy products and meat. d. Used for energy, but when it is in greater abundance than needed it becomes stored in adipose tissue. 4. Vitamins a. Fat soluble vitamins are A, D, E and K. b. Water soluble vitamins are B vitamins and	A. Lecture/Discussion B. Assigned Readings C. Use anatomical diagrams/ posters/videos/computer assisted learning/ workbook activities. D. Have students divide up into groups and create nutritional posters using pictures from magazines.

C. 5. Minerals a. 4% of total body weight. b. Found in the bones and teeth. c. Cells use minerals to make enzymes, cell membranes and various proteins such as hemoglobin.	