

# Alimentation Module –Year 1 Semester 2(2012/13 Batch)

Credits – 5

**Duration: 05 Weeks (25 days)**

**Date of commencement: 11<sup>th</sup> September, 2014**

**Final document - revised on 25<sup>th</sup> July, 2014**

Topics/Concepts	Objectives	Time	Department	T/L activity
<b>2012-1/SBM-4/1</b> <b>Role of the digestive system</b> <b>Process of nutrient intake;</b>	<b>Student should be able to:</b> 1. state the main functions of the gastrointestinal system. 2. outline the general structure of gastrointestinal system to perform the functions 3. describe the general pattern and microscopic Anatomy of the alimentary canal	1 hr	Anatomy	Lecture: 1 hr
<b>2012-1/SBM-4/2</b> <b>Functional anatomy of the oral cavity</b>	1. describe the boundaries of the oral cavity. 2. state how the structures in the oral cavity are adapted to perform the functions (teeth, tongue, salivary glands etc) 3. outline the macroscopic and microscopic features of the structures in the oral cavity including the salivary glands 4. state and identify the muscles forming the floor of the mouth 5. name and identify the types of teeth in the deciduous and permanent dentition 6. state the development and eruption times of teeth and its relevance in aging	5hrs	Anatomy	Lecture: 2hrs  Practical: 3 × 1/3 batch
<b>2012-1/SBM-4/3</b> <b>a. Mastication</b> <b>b. saliva</b> <b>c. Taste</b>	1. describe the functional anatomy of the tongue and taste buds. 2. Describe the role of mastication in digestion. 3. state the importance of saliva in digestion, its composition, how the ionic composition is modified by passage through the ducts. 4. explain the factors concerned in the regulation of salivary secretion. 5. describe the conditioned reflexes involved in salivary secretion. 6. explain the role of saliva in oral hygiene.	2hrs	Physiology	Lectures: 2 hrs



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<b>2012-1/SBM-4/4 Swallowing</b>	<ol style="list-style-type: none"> <li>1. state the subdivisions of the pharynx and name the muscles of the pharyngeal wall</li> <li>2. describe the macroscopic and microscopic structure of the esophagus</li> </ol>		Anatomy	Allocated time shifted to SBM- 4/7
	<ol style="list-style-type: none"> <li>3. describe the three stages of swallowing in terms of mechanics and nervous control.</li> <li>4. describe the nervous control, mechanics and function of the lower oesophageal sphincter (LOS).</li> </ol>	3hrs	Physiology	Lecture: 1 hr SGD: 2 hrs
<b>2012-1/CLM-4/1 Surface projection of abdominal organs</b>	<ol style="list-style-type: none"> <li>1. state how the abdomen is divided into nine regions</li> <li>2. state the surface projections of abdominal structures.</li> <li>3. outline the procedure of clinical examination of the abdomen.</li> </ol>	4 hrs	Anatomy	Video demonstration: 1 hr  Practical demonstration: 3hrs
<b>2012-1/CLM-4/2 Anterior Abdominal wall</b>	<ol style="list-style-type: none"> <li>1. describe the arrangement of muscles of the anterior abdominal wall</li> <li>2. describe the formation of the rectus sheath</li> </ol>	3hrs	Anatomy	Dissections: 3 hrs
<b>2012-1/SBM-4/5 Inguinal canal, scrotum, spermatic cord and testis</b>	<ol style="list-style-type: none"> <li>1. describe the formation of the inguinal canal and its boundaries</li> <li>2. state the contents of the inguinal canal</li> <li>3. describe the coverings of the spermatic cord</li> <li>4. describe the formation of hernia</li> <li>5. explain the embryological descent of testes in relation to adult anatomy</li> <li>6. relation to adult anatomy</li> </ol>	7 hrs	Anatomy	Lecture: clinical 1 hr  Dissections: 6hrs



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<b>2012-1/CLM-4/3</b> <b>Body compartmentalisation</b> <b>Abdominal cavity</b>	<ol style="list-style-type: none"> <li>1. describe the peritoneal reflexions</li> <li>2. describe the general arrangements of viscera in the abdominal cavity</li> <li>3. understand the arrangement of the peritoneum and its relationship with the abdominal organs</li> <li>4. localise the GI viscera within the abdominal cavity and learn their gross landmarks and features</li> </ol>	6hrs	Anatomy	Dissections: 6 hrs
<b>2012-1/SBM-4/6</b> <b>General organization of the alimentary canal to perform its function</b>	1. Recall the general pattern of microscopic anatomy of the alimentary canal.			
	<ol style="list-style-type: none"> <li>2. describe the electrical and contractile properties of gastrointestinal smooth muscle.</li> <li>3. explain the neural control of gastrointestinal function.</li> </ol>	2hrs	Physiology	Lectures: 2 hrs
<b>2012-1/SBM-4/7</b> <b>Fate of food in the alimentary tract</b> <b>a. The stomach</b>	<ol style="list-style-type: none"> <li>1. describe the macroscopic and microscopic structure of the esophagus</li> <li>2. list the functions of the stomach.</li> <li>3. explain how structure is organized to perform the functions (macroscopy, microscopy, innervation and blood supply).</li> </ol>	8hrs	Anatomy	Lecture: 2hrs  Dissections 6 hrs
<b>b. Gastric secretion</b>	<ol style="list-style-type: none"> <li>1. describe a typical oxyntic gland and list the secretions from each type of cell in the gland.</li> <li>2. explain the role of each of the secretions in digestion and absorption.</li> </ol>	4hrs	Physiology	Lecture: 2 hrs on acid secretion  SGD: 2 hrs
	<ol style="list-style-type: none"> <li>3. explain the mechanism of secretion of HCl from the parietal cell.</li> <li>4. explain the nervous, hormonal and chemical regulation of gastric secretion.</li> <li>5. explain the role of gastric secretion in the aetiology of gastric ulcer.</li> </ol>	5 hrs	Physiology	CCR – 5 hrs
<b>c. Gastric emptying</b>	<ol style="list-style-type: none"> <li>1. describe the motor functions of the stomach including gastric emptying.</li> <li>2. describe the important factors that determine gastric emptying.</li> </ol>	1 hr	Physiology	Lecture: 1 hr
<b>2012-1/SBM-4/8</b> <b>Fate of food in the alimentary tract</b> <b>a. Small intestine</b>	<ol style="list-style-type: none"> <li>1. list the functions of the small intestine.</li> <li>2. describe the anatomy of the duodenum, jejunum and ileum.</li> <li>3. describe the gross morphology, relationships,</li> </ol>	12hrs	Anatomy	Dissections: 6hrs  Histology practical: 3hrs × 1/3 batch



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<b>b. Liver</b>	and blood supply of the liver, gall bladder, biliary tree, pancreas and spleen			Dissections:3 hrs
<b>c. Secretory processes in the duodenum</b>	4. describe the secretory functions of the duodenum, jejunum, ileum, pancreas and GB. 5. describe the control of secretions (hormonal, nervous).	4 hrs	Physiology	Lectures: 2 hrs  SGD: 2 hrs
<b>d. Gastrointestinal Hormones</b>	1. name the GI hormones and their sites of release 2. state the functions of the GI hormones	1 hr	Biochemistry	Lecture: 1 hr
<b>e. Liver</b>	1. recall the arrangement of the lobules, the bile canaliculi and cholangioles, the hepatic sinusoid and portal canal. 2. describe the biliary secretory apparatus. 3. explain the functions of the liver in the following activities. 3.1 Synthesis of bile and its excretion. 3.2 Synthesis of proteins and secretion. 3.3 Synthesis of lipoproteins. 3.4 Synthesis of glucose, glycogen and ketone bodies. 3.5 Detoxication. 4. recognise that liver dysfunction may be determined by tests based on a) excretory b) biosynthetic c) metabolic functions, and d) blood levels of liver specific enzymes. 5. describe the metabolic derangements resulting from the deficiency (Glycogen storage disease) of a) glycogen synthetase b) debranching enzyme c) phosphorylase and d) glucose-6-phosphatase in the liver. 6. explain the biochemical basis of the following 'excretory tests'. a) Serum level of conjugated and unconjugated forms of bilirubin. b) bromosulphathalein excretion. 7. explain how the biosynthetic capacity may be tested by estimating the following	7hrs	Biochemistry	Lectures: 2 hrs  Practical: 3 hrsx ½ batch  SGD: 2 hrs



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	<p>7.1 Carbohydrate metabolism by the fasting blood glucose level and the glucose tolerance test.</p> <p>7.2 Lipid metabolism by the lipid profile.</p> <p>7.3 Protein metabolism by the blood urea and the ammonium concentration.</p> <p>8. correlate the degree of cell damage with change in the serum enzyme levels.</p> <p>8.1 An elevation of serum alkaline phosphatase (heat stable form) in hepatobiliary dysfunction.</p> <p>8.2 An elevation of amino transferases (AST, ALT) in liver damage.</p> <p>8.3 AST / ALT &lt; 1 in acute liver damage and AST / ALT &gt; 1 in chronic liver damage.</p> <p>8.4 An elevation of lactate dehydrogenase (LD5 or M4) in liver damage.</p> <p>8.5 A persistent higher elevation of the total serum LDH relative to serum ALT level in acute hepatitis.</p> <p>9. explain the factors that promote the formation of gall stones.</p> <p>10. describe the role of liver in cholesterol excretion, (role of phospholipid and bile acids in cholesterol excretion), and applications in Medicine</p> <p>11. state the composition of the different types of gall stones commonly found.</p>			
<p><b>f. Digestion and Absorption</b></p> <p><b>(i). Mouth</b></p> <p><b>(ii). Stomach</b></p> <p><b>(iii). Small Intestine</b></p>	<p>1. recall the composition of saliva.</p> <p>2. state the constituents of saliva that aid in the digestion of food</p> <p>3. name the three most important constituents released by the gastric mucosa and explain their functions.</p> <p>4. explain the activation of pepsinogen and its role in milk clotting and protein digestion.</p> <p>5. state the dietary constituents that are absorbed in the stomach.</p> <p>6. describe the organization of the intestinal brush border to promote maximum absorption of nutrients.</p> <p>7. list enzymes secreted by the intestinal mucosa.</p> <p>8. name the channels through which pancreatic and biliary secretions are delivered.</p>	8 hrs	Biochemistry	<p>Lectures: 3 hrs</p> <p>Practicals: 3 hrs x ½ batch</p> <p>SGD: 2 hrs</p>



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<p><b>(iv). Large Intestine</b></p>	<ol style="list-style-type: none"> <li>9. list the constituents of pancreatic secretion</li> <li>10. list the constituents of bile and explain their functions.</li> <li>11. explain digestion of carbohydrate, protein and fat in the intestine.</li> <li>12. recognise that cells lining the small intestine are sloughed off every 2-5 days and these are digested and used.</li> <li>13. explain the importance of the architecture of the small intestine in the maintenance of the nutritional status of the body.</li> <li>14. state the sites of absorption of nutrients.</li> <li>15. Understand the importance of <ol style="list-style-type: none"> <li>a) Na<sup>+</sup> in glucose and amino acid absorption</li> <li>b) B6 in amino acid metabolism</li> <li>c) bile salts &amp; phospholipids in fat absorption</li> <li>d) intrinsic factor in B<sub>12</sub> absorption</li> <li>e) Vitamin D in Ca<sup>2+</sup> absorption</li> <li>f) Vitamin C in Fe<sup>2+</sup> absorption.</li> </ol> </li> <li>16. state the products of protein digestion that enter the absorptive cell.</li> <li>17. list the carriers known to transport groups of amino acids in to the absorptive cell.</li> <li>18. explain why the composition of amino acids appearing in the blood differs from those in the ingested protein.</li> <li>19. recognise that the uptake of micelles is dependent on the size. <ol style="list-style-type: none"> <li>20. describe the alteration to the lipid constituents in the enterocytes before entering the blood via the lymphatic and the portal systems.</li> <li>21. describe the structure of a chylomicron and its fate in the blood.</li> <li>22. describe the enterohepatic circulation and its importance in fat digestion.</li> <li>23. recognise that water and volatile fatty acids, vitamin K and ammonia arising from bacterial action is absorbed in the large intestine.</li> </ol> </li> </ol>			
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<b>g. Pancreas</b>	<ol style="list-style-type: none"> <li>1. state the constituents of exocrine secretion and their role in carbohydrate, protein and fat digestion.</li> <li>2. list the conditions that result in exocrine dysfunction and explain how each affects digestion.</li> <li>3. describe the laboratory tests for diagnosis of exocrine dysfunction.</li> </ol>	1 hr	Biochemistry	Lecture: 1 hr
<b>h. Digestive Disorders</b>	<ol style="list-style-type: none"> <li>1. explain the digestive disorders resulting from achlorhydria, intrinsic factor deficiency, biliary deficiency, lactase deficiency, protein energy deficiency, folate and B<sub>12</sub> deficiency, pancreatic exocrine insufficiency and coeliac disease.</li> <li>2. explain the alteration of the constituents present in the blood, urine and the faeces in the disorders stated in 1.</li> <li>3. state the change in the lactase activity with age and the variation in activity and the type in adults of the different ethnic groups.</li> <li>4. relate the clinical signs and symptoms with biochemical derangements in lactose intolerance.</li> <li>5. explain the biochemical tests that can be done to investigate disorders stated in 1.</li> <li>6. explain the mechanism of diarrhea using <i>Vibrio cholerae</i> as example</li> </ol>	4 hrs	Biochemistry	Lecture: 2 hr  Practical demonstration: 2 hrs x ½ batch
<b>2012-1/SBM-4/9 Fate of food in the a. large intestine</b>	<ol style="list-style-type: none"> <li>1. list the functions of the colon, rectum and anal canal</li> <li>2. describe the functional anatomy of the large intestine including rectum and anus</li> </ol>	8hrs	Anatomy	Dissections: 6hrs  Tutorial: 2hrs
<b>b. Colonic movements and functions of the large intestine</b>	<ol style="list-style-type: none"> <li>1. describe the movements of the colon including the rectum</li> <li>2. describe the absorptive (water and electrolytes) and synthetic functions of the colon.</li> </ol>	2hrs	Physiology	Lecture: 1 hr
<b>c. Defaecation</b>	<ol style="list-style-type: none"> <li>1. describe the structures and neural pathways and important in maintaining the defaecation reflex.</li> <li>2. describe the sequence of events leading to defaecation (it is assume that they know the structure)</li> </ol>			Lecture: 1 hr



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<b>d. Role of normal microbial flora of the gut</b>	<ol style="list-style-type: none"> <li>1. define normal flora.</li> <li>2. list the normal microbial flora in various anatomical sites (mouth, stomach, intestines) of the GIT.</li> <li>3. discuss the significance of normal microbial flora of the GIT (benefits and adverse effects).</li> <li>4. briefly discuss the factors which can make changes in the normal microbial flora.</li> </ol>	3 hrs	Microbiology	Lecture: 1 hr SGD : 2 hrs
<b>2012-2/SBM-4/10 Development of the alimentary tract</b>	describe the development of the alimentary tract and its anomalies	4 hrs	Anatomy	Lecturers: 4 hrs
<b>2012-2/SBM-4/11 Functional defects</b>	1. explain the mechanism of vomiting, including the location and connections of the vomiting center and the role of the chemoreceptor trigger zone.	1hr	Physiology	Lecture: 1 hr
	2. describe the dysfunction of GIT motility (vomiting, reflux, achalasia, diarrhoea)	1 hr	Medicine	Lecture: 1 hr
<b>2012-2/SBM-4/12</b>	Physiology of Jaundice	2 hrs	Physiology	Lecture: 2 hrs
<b>2012-1/CLM-4/4 Imaging of GIT and accessory organs</b>	<ol style="list-style-type: none"> <li>1. list the imaging modalities used to assess the GI tract.</li> <li>2. identify the normal anatomy of the gastrointestinal tract and accessory organs in different imaging modalities</li> </ol>	2hrs	Radiology	Lecture demonstration: 2hrs
<b>2012-1/CLM-4/5 Clinical examination of abdomen</b>	Clinical examination	2h	Medicine	Lecture: 1 hr Clinical demonstration: 1 hr



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