

**Excretion & Reproduction Module -- Year 2 Semester 1**  
**2013/14 Batch**

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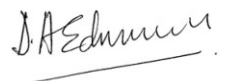
(Final document revised on 11<sup>th</sup> November, 2015)

Concept	Objectives	Time	Dept in-charge	T/L activity
	<b>The student should be able to,</b>			
<b>2013-1/SBM-5/01</b>				
<b>Introduction to excretion</b>	1. explain what is meant by excretion 2. explain why the body requires excretory mechanisms to maintain health 3. list the organ systems involved in excretion 4. list the waste products excreted by each of the above system 5. explain the role of the following in excretion (i). skin (ii). liver, biliary complex and the gut (iii). lungs (iv). kidneys and the urinary tract	1h	Head/ Biochemistry	Lecture
	6. examination of normal urine – Urinalysis (i). volume/ appearance/ osmolality/ pH (ii). presence of blood, glucose, protein (iii). cells, casts, bacteria	3h	Head/ Biochemistry	PD
<b>2013-1/SBM-5/02</b>				
<b>Posterior abdominal wall</b>	1. describe the posterior abdominal viscera	1h	Head/ Anatomy	Dissections
	2. describe the arrangement of muscles and fascia in the posterior abdominal wall			Lecture
	3. describe the structures* found on the posterior abdominal wall	6h		Dissections



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<b>2013-1/SBM-5/03</b>				
<b>Kidneys and the urinary tract</b>				
<b>a. Gross and microscopic anatomy of kidneys and the urinary tract</b>	<ol style="list-style-type: none"> <li>1. list the components of the urinary system</li> <li>2. describe the gross structure of the kidneys, Ureters and bladder</li> <li>3. describe how the urinary system is adapted to perform its function</li> <li>4. describe the unique blood circulation of the kidney</li> <li>5. describe the venous drainage and nerve supply of the kidney</li> <li>6. state the lymphatic drainage</li> <li>7. describe the histological appearance of the urinary system</li> </ol>	3h	Head/ Anatomy	Dissections
		2h		Lecture
<b>b. Osteology of the pelvis</b>	<ol style="list-style-type: none"> <li>1. identify the bones and ligaments forming the pelvis.</li> <li>2. name and identify the major foramina of the bony pelvis.</li> <li>3. differentiate between the true pelvis and the false pelvis in terms of their structures and locations.</li> <li>4. identify all bones found in this region and discuss the role of any associated tuberosities, grooves and prominences</li> <li>5. describe the differences observed between the male and the female pelvis</li> <li>6. Applied anatomy of the urinary system</li> </ol>	3×3h		Histology practical
		3 h		Dissections
		1h		Lecture
<b>2013-1/SBM-5/04</b>				
<b>Normal imaging Anatomy of the urinary tract</b>	<ol style="list-style-type: none"> <li>1. list the different imaging modalities used to assess the urinary system</li> <li>2. identify the normal imaging anatomy of the urinary system in different imaging modalities</li> </ol>	1h	Radiology	Lecture
<b>2013-1/SBM-5/05</b>				
<b>Development and anomalies of Urinary tract</b>	<ol style="list-style-type: none"> <li>1. describe the development of the urinary system <ol style="list-style-type: none"> <li>(i). pronephros</li> <li>(ii). mesonephros</li> <li>(iii). metanephros (Permanent Kidney)</li> <li>(iv). bladder and urethra</li> </ol> </li> </ol>		Head/ Anatomy	Lecture
	<ol style="list-style-type: none"> <li>2. describe the anatomical basis of the following <ol style="list-style-type: none"> <li>(i). congenital malformations</li> <li>(ii). congenital polycystic kidney</li> <li>(iii). pelvic kidney</li> <li>(iv). horse-shoe kidney</li> <li>(v). renal agenesis</li> <li>(vi). double ureter</li> <li>(vii). urachal fistula, cysts and sinuses</li> </ol> </li> </ol>	1h	Head/ Anatomy	Lecture

  
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<b>2013-1/SBM-5/06</b> <b>Functions of the kidneys</b> <b>Formation of urine</b>	<ol style="list-style-type: none"> <li>1. recognise that the functional unit of the kidney is the nephron.</li> <li>2. list the two different types of nephrons and state the structural differences between them</li> <li>3. describe the process of urine formation - filtration, secretion and reabsorption</li> </ol>	1h	Head/ Physiology	Lecture
<b>GFR and factors affecting GFR</b>	<ol style="list-style-type: none"> <li>1. describe the glomerular membrane, in terms of the major layers and its permeability characteristics.</li> <li>2. explain in terms of size and electrical charges of the pores of the membrane and why the glomerular membrane has a high degree of selectivity.</li> <li>3. state the glomerular pressure, Bowman's capsular pressure and the colloid osmotic pressure in the glomerular capillaries and explain how these pressures cause filtration of fluid at the glomerulus.</li> <li>4. state the composition of the glomerular filtrate.</li> <li>5. explain the terms GFR and filtration fraction and give their normal values.</li> <li>6. describe the effect of the following on the GFR: <ol style="list-style-type: none"> <li>(i). renal blood flow</li> <li>(ii). afferent arteriolar constriction</li> <li>(iii). efferent arteriolar constriction</li> <li>(iv). sympathetic stimulation</li> <li>(v). outflow obstruction</li> </ol> </li> <li>7. recognise that GFR is kept constant with wide changes in arterial blood pressure by means of "autoregulation".</li> </ol>	2h		Lecture
		2h	Head/ Physiology	SGD
<b>b. Tubular functions</b>	<ol style="list-style-type: none"> <li>1. compare the structural characteristics and the absorptive properties of the epithelial cells in the proximal tubule, thin and thick segments of the loop of Henle, the diluting segment, the late distal tubule and the collecting duct.</li> <li>2. recall the processes of primary and secondary active transport.</li> <li>3. recognise that nutrients such as glucose, proteins, amino acids and vitamins are almost completely reabsorbed by active transport.</li> <li>4. explain the process of glucose transport</li> <li>5. explain the concept of tubular maximum as applied to glucose transport.</li> <li>6. describe by giving examples the process of passive absorption Recognise that water transport occurs entirely by osmotic diffusion and state the volumes of fluid flowing per minute and percentages reabsorbed at different parts of the tubule.</li> <li>7. recognise that major metabolic end-products such as urea and creatinine are poorly reabsorbed.</li> <li>8. describe the process of reabsorption of electrolytes <math>\text{Na}^+</math> , <math>\text{K}^+</math> , <math>\text{Cl}^-</math> and <math>\text{HCO}_3^-</math> by the tubules.</li> </ol>	2h	Head/ Physiology	Lecture



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<p><b>a. Renal clearance, counter current mechanisms – 2h Lectures (+ 2h SGD)</b></p>	<p><b>Clearance</b></p> <ol style="list-style-type: none"> <li>1. explain the concept of plasma clearance and indicate how clearance of a substance is affected by reabsorption and secretion.</li> <li>2. explain how GFR can be measured by using inulin, creatinine and urea. state the advantages and disadvantages of the above substances as measures of GFR.</li> <li>3. explain how PAH (para-aminohippuric acid) is used to measure renal plasma flow</li> </ol>	1h	Head/ Physiology	Lecture
<p><b>c. Renal handling of water</b></p>	<ol style="list-style-type: none"> <li>1. explain the role of ADH in producing a dilute urine.</li> <li>2. explain how the loop of Henle functions as a countercurrent multiplier and the vasa recta function as countercurrent exchangers.</li> <li>3. explain the role of ADH and the countercurrent mechanism in concentrating urine.</li> <li>4. explain the hypothalamic mechanism controlling ADH secretion and thirst.</li> <li>5. state the normal range of volume, specific gravity and osmolality of urine.</li> <li>6. explain the terms: water diuresis, osmotic diuresis, pressure diuresis.</li> <li>7. measure volume and specific gravity of urine.</li> <li>8. to assess the excretion of water and solutes under resting conditions and after ingestion of different fluid/solute loads</li> </ol>	1h	Head/ Physiology	Lecture
		2h	Head/ Physiology	SGD
		3h (x3)	Head/ Physiology	PD
<b>2013-1/SBM-5/07</b>				
<p><b>Role of the kidney in Acid-Base balance</b></p>	<ol style="list-style-type: none"> <li>1. recognise that large amounts of HCO<sub>3</sub><sup>-</sup> are filtered at the glomerulus and H<sup>+</sup> is secreted into the tubular lumen and that pH can be controlled by a balance between these two processes.</li> <li>2. explain the mechanism of transport of H<sup>+</sup> and HCO<sub>3</sub><sup>-</sup> in the proximal and distal tubular segments.</li> <li>3. describe how H<sup>+</sup> are buffered in the kidney by the following; <ol style="list-style-type: none"> <li>(i). ammonia buffer</li> <li>(ii). bicarbonate buffer</li> <li>(iii). phosphate buffer</li> </ol> </li> <li>4. state the possible limits of pH in urine</li> </ol>	2h	Head/ Physiology	Lecture

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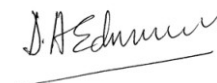
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<b>2013-1/SBM-5/08</b>				
<b>Functions of the kidneys</b>	<ol style="list-style-type: none"> <li>1. describe the Urea cycle/ xenobiotics <ol style="list-style-type: none"> <li>(a). Enzymes of the urea cycle</li> <li>(b). Regulation of urea biosynthesis</li> <li>(c). Urea cycle enzymopathies</li> <li>(d). Effects of hyperammonemia</li> <li>(e). Urea cycle enzymes in kidney</li> <li>(f). Xenobiotics</li> </ol> </li> <li>2. describe the regulation of erythropoiesis by kidneys</li> <li>3. describe the contribution to the synthesis of Vitamin D</li> <li>4. describe the fluid and electrolyte balance in, <ol style="list-style-type: none"> <li>i. control blood volume by regulating the volume of urine produced</li> <li>ii. regulates the homeostasis of major ions in the body fluids: <ol style="list-style-type: none"> <li>a. state the osmolality and Na<sup>+</sup> concentration of ECF</li> <li>b. recognise that ECF osmolality is determined mainly by Na<sup>+</sup> concentration</li> <li>c. describe the role of the hypothalamic osmoreceptors and ADH in controlling ECF osmolality.</li> <li>d. state the location of the thirst centre and describe the role of the thirst mechanism in controlling ECF osmolality and Na<sup>+</sup>.</li> <li>e. explain the renin-angiotensin-aldosterone mechanism.</li> <li>f. explain the mechanism by which aldosterone controls Na<sup>+</sup> transport in the kidney.</li> <li>g. recognise that Na<sup>+</sup> is exchanged for K<sup>+</sup> and/or H<sup>+</sup> in the distal part of the nephron.</li> <li>h. explain the role of salt appetite in the control of ECF Na<sup>+</sup>.</li> <li>I. explain the effect of arterial baroreceptors, low pressure receptors, ANP, aldosterone and ADH in maintaining blood volume and ECF volume.</li> <li>j. explain the mechanism of K<sup>+</sup> reabsorption and secretion in the renal tubules.</li> <li>k. explain the effect of aldosterone in the control of K<sup>+</sup> secretion.</li> </ol> </li> </ol> </li> </ol>	3h	Biochemistry	Lecture
		2h	Head/ Physiology	Lecture
<b>2013-1/SBM-5/09</b>				
<b>Micturition</b>	<ol style="list-style-type: none"> <li>1. describe the functional anatomy of the urinary bladder including the innervations</li> <li>2. describe the micturition reflex and explain how it is modified by centers in the brain stem and cerebral cortex</li> <li>3. describe the pressure changes in the bladder with increase of its volume (physiological basis of cystometrogram)</li> <li>4. explain the derangements in micturition in the following abnormalities; <ol style="list-style-type: none"> <li>a. interruption of afferent nerves from the bladder</li> <li>b. interruption of both afferent and efferent nerves</li> </ol> </li> </ol>	2h	Head/ Physiology	Lecture



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	<p>c. interruption of descending pathways  d. damage to spinal cord centres</p> <p>5. explain the physiological basis of bladder dysfunction and dysfunctions in micturition</p>			
<b>2013-1/SBM-5/10</b>				
<p><b>a. Mechanisms of dysfunction of the kidneys and the urinary tract</b></p> <p><b>b. Effects of abnormal renal function</b></p> <p><b>c. Kidney and Homeostasis</b></p>	<p>1. list the physiological consequences of reduced nephron mass, GFR., tubular function etc</p> <p>2. list 5 major causes that can lead to reduced GFR.</p> <p>3. list the effects of reduced GFR on function of other organ systems</p> <p>4. list the effects on the kidney due to altered functions of other systems</p> <p>5. list conditions which causes obstruction to the urine flow</p> <p>6. define the term renal failure</p> <p>i. identify abnormal constituents found in the urine in renal diseases</p> <p>ii. list important consequences of renal diseases</p> <p>iii. Assessment of renal dysfunction and failure</p> <p>Round up session using clinical case demonstration</p>	5h	CCR group	CCR
<b>2013-1/CLM-5/01</b>				
<b>Abnormal constituents of urine</b>	<p>i. Abnormal constituents of urine</p> <p>ii. Renal calculi</p>	3h (x 2)	Head/ Biochemistry	PD



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<b>2013-1/SBM-5/11</b>				
<b>Introduction to human reproduction</b>	<ol style="list-style-type: none"> <li>recall the stages of meiosis</li> <li>compare and contrast meiosis and mitosis</li> <li>describe the advantages and disadvantages of sexual reproduction</li> </ol>	1h	Head/ Anatomy	Lecture
<b>2013-1/SBM-5/12</b>				
<b>Biological differences between male and female</b>	<ol style="list-style-type: none"> <li>explain the structural, functional and behavioural differences between a male and female</li> </ol>		Head/ Psychiatry	Lecture
<b>2013-1/SBM-5/13</b>				
<b>An overview of reproduction</b>	<ol style="list-style-type: none"> <li>biochemistry of sex hormones <ol style="list-style-type: none"> <li>state the sources, biosynthesis and metabolism of testosterone and give the sources of other androgens in the body</li> <li>describe the sources, biosynthesis and metabolism of the female sex hormones</li> </ol> </li> </ol>	2h	Head/ Biochemistry	Lecture
<b>2013-1/SBM-5/14</b>				
<b>Structure of male and female genital tracts and breast</b>	<ol style="list-style-type: none"> <li>describe the gross structure of the male and female genital systems</li> <li>describe the light microscopic appearance of the male and female genital systems</li> <li>describe the gross structure and the light microscopic appearance of the breast</li> <li>applied anatomy of the breast</li> </ol>	3h  2×3 h	Head/ Anatomy  Head/ Anatomy	Lecture  Histology Practical
<b>2013-1/SBM-5/15</b>				
<b>Normal imaging anatomy of the reproductive system</b>	<ol style="list-style-type: none"> <li>list the different imaging modalities used to assess the male and female reproductive systems</li> <li>identify the normal imaging anatomy of the male and female reproductive systems in different imaging modalities</li> </ol>	1h	Radiology	Lecture
<b>2013-1/SBM-5/16</b>				
<b>Spermatogenesis and male sex hormones</b>	<p><b><u>Spermatogenesis</u></b></p> <ol style="list-style-type: none"> <li>recognise that spermatogenesis begins around puberty and continues throughout life</li> <li>describe the process of formation of spermatids and the formation of male and female sperms.</li> <li>state the role of Sertoli cells in spermatogenesis</li> <li>state the role of the epididymis in sperm maturation and list the areas where sperms are stored</li> <li>describe the structure and functions of the mature sperm</li> </ol>	2h	Head/ Physiology	Lecture



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	<p>6. state the life span of a sperm in the  (i). male genital tract  (ii). ejaculate</p> <p>7. state the functions of the male accessory sexual structures</p> <p>8. describe semen in terms of; contributory sources/ volume/ appearance/ pH/ composition</p> <p>9. state the normal sperm count and give the effect of the sperm count on fertility</p> <p><u>Male sex hormones</u></p> <p>10. state the pattern of testosterone secretion throughout the different stages of life</p> <p>11. explain the feedback regulation of testosterone secretion</p> <p>12. explain the role of inhibin in spermatogenesis</p> <p>13. state the effects of testosterone on  (i). development of primary and secondary sexual characteristics in the adult  (ii). body hair distribution and baldness  (iii). voice /skin /muscular development  (iv). bone and Ca<sup>2+</sup> metabolism  (v). erythropoiesis</p>	3h	Head/ Physiology	PD
<b>2013-1/SBM-5/17</b>				
<b>Puberty</b>	<p>1. explain the terms “thelarche”, “pubarche”, “menarche”, “adrenarche” and “puberty”</p> <p>2. explain the hormonal changes responsible for the onset of puberty</p> <p>3. define the term “adolescence”</p> <p>4. explain the terms “gender”, “sex role identity”</p>	2h	Head/ Physiology	Lecture
<b>Ovarian cycle and female sex hormones</b>	<p>1. recognise that female sex hormones are secreted in a monthly cyclical manner</p> <p>2. describe the hormonal, functional and histological changes in the human reproductive cycle in terms of the ovarian cycle/ the uterine cycle and the cervix/ vaginal changes/ breast changes</p> <p>3. describe the hormonal control of the reproductive cycle in terms of the interaction between hypothalamic, pituitary and ovarian hormones</p> <p>4. recognise that the reproductive cycles cease around menopause and explain the changes that occur in the female reproductive system at menopause state the effects of the estrogens on  (i). primary and secondary sexual organs  (ii). the breasts  (iii). the skeleton  (iv). the skin  (v). the pattern of fat deposition</p>	<p>3 h</p> <p>2h</p> <p>2h +2 h 1h</p>	<p>Head/ Physiology</p> <p>Head/ Physiology</p> <p>CCR group</p>	<p>Lecture</p> <p>SGD</p> <p>CCR</p>

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	6. describe the effects of progesterone on (i). the uterus (ii). the fallopian tube (iii). the breast (iv). Thermogenesis			
<b>2013-1/SBM-5/18</b>				
<b>Adolescent behaviour</b>	1. define the term "adolescence" 2. explain the terms "gender, sex role identity"	1h	Head/ Psychiatry	Lecture
<b>2013-1/SBM-5/19</b>				
<b>a. Psychosocial aspects of human sexuality</b>	1. describe briefly the psychosocial aspects of human sexuality 2. explain the psychological concepts of masculinity and femininity 3. explain the term "sexual orientation"	1h	Head/ Psychiatry	Lecture
<b>b. Sexuality and sexual response</b>	1. state the neuronal mechanism and the psychic stimuli involved in the male and female during the sexual act 2. state the stages of the male sexual act including the role of the autonomic nervous system 3. describe female orgasm and its associated physiological changes 4. explain the physiological changes associated with the sexual act	1h	Head/ Physiology	Lecture
<b>2013-1/SBM-5/20</b>				
<b>Fertilization, tubal functions and implantation</b>	1. recall the pathway taken by sperms (spermatozoa) from the site of formation up to ejaculation 2. describe the role of neural reflexes in controlling penile erection and ejaculation. 3. state the period of viability and the conditions affecting viability of a sperm in the female genital tract. 4. describe the process and timing of fertilization, and where it takes place. 5. describe the structural and functional changes of the endometrium in relation to implantation and embryonic development	1h	Head/ Physiology	Lecture
<b>2013-1/SBM-5/21</b>				
<b>Contraceptives</b>	describe the methods commonly used to prevent conception and their sites of action	1h	Head/ Com. Medicine Head/ Physiology	Lecture  PD
<b>2013-1/SBM-5/22</b>				
<b>a. Pelvis, reproductive organs etc.</b>	1. name and identify the blood vessels that pass from the posterior abdominal wall into the pelvis. 2. identify the branches of the anterior and posterior divisions of the internal iliac artery. 3. relate the muscles of the pelvic wall and floor to one another and to their attachments.	8h	Head/ Anatomy	Prosections /Dissections

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<b>b. Perineum</b>	4. differentiate between the pelvic diaphragm and the urogenital diaphragm. 5. compare the organs in the female pelvis with those in the male pelvis. 6. describe the clinical significance of the peritoneal fossae related to the uterus. 7. describe the lymphatic drainage as it relates to the structures in this region. 8. visualize and relate structures of the male and female pelvis with respect to adjacent structures. 9. describe the differences between the male and the female pelvis 10. applied anatomy of the pelvic organs 11. describe the general layout of the perineum 12. describe the urogenital diaphragm 13. describe the superficial and deep perineal pouch 14. describe the boundaries and regions of the perineum 15. identify the muscles of the male and female perineum and their attachments. 16. differentiate between the urogenital triangle and the anal triangle. 17. identify the blood vessels and nerves supplying the structures of the perineum. 18. pudendal block, epidural anaesthesia 19. identify other regions into which the superficial fascial layers of the perineum are continuous. 20. identify the major arteries supplying the perineum. 21. describe the lymphatic drainage as it relates to the structures in this region. 22. visualize and relate structures of the male and female perineum with respect to adjacent structures Applied anatomy of the pelvis and perineum	2h		Body-side Tutorial
		1h		Lecture
		6h		Prosections /Dissections
		1h	Head/ Gyn & Obs	Lecture
<b>2013-1/SBM-5/23</b>				
<b>Development and anomalies of male and female reproductive system</b>	development of the reproductive system including development abnormalities	2h	Head/ Anatomy	Lectures
<b>2013-1/SBM-5/24</b>				
<b>Pregnancy</b>	1. to appreciate the physiological and physical changes in pregnancy (duplicated in No. 2 objective – done by physiology)		Head/ Psychiatry	Lecture
	2. describe the hormonal and physiological changes in mother during pregnancy 3. describe the functional anatomy of the placenta	2h	Head/ Physiology	Lecture

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	4. recall the processes of diffusion of the following across the placenta → O <sub>2</sub> , CO <sub>2</sub> , glucose and other nutrients 5. state the excretory functions of the placenta			
<b>2013-1/SBM-5/25</b>				
<b>Parturition, puerperium and lactation</b>	1. describe the patterns of uterine contractions during pregnancy and labour 2. explain the physiological events taking place during parturition	1 h	Head/ Physiology	Lecture
	1. list the hormones involved in lactation and describe their role 2. describe the process of milk ejection and the role of oxytocin in milk ejection 3. describe the patterns of prolactin secretion, its control by the hypothalamus and state its actions 4. appreciate the psychological effects of parturition, puerperium and lactation 5. appreciate the mechanism of Labour	2 h	Head/ Psychiatry  Head/ Gyn. & Obs.	Lecture  Lecture
<b>2013-1/SBM-5/26</b>				
<b>Physiology of the fetus</b>	1. describe the functional development of circulatory system and respiratory system of the fetus 2. describe the fetal adaptations for gas exchange 3. explain the readjustments at birth and changes in the neonatal period of the blood, circulation, respiration, kidneys, liver, digestive system, body temperature, metabolism and nervous system.	2h	Head/ Physiology	Lecture

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