COURSE: SYSTEMIC PATHOLOGY

CLASS: MDIV

SEMESTER: Summer 2015

COORDINATOR /INSTRUCTORS: D. Hammoudi. MD Associate Professor

Email: sinoemedical@comcast.net

WEBSITE: http://sinoemedicalassociation.org/pathologylectures/

Office hours: everyday outside lectures time.

Course Schedule

Monday to Friday:  8 am to 10 am    Wednesday: 3 - 5 pm
COURSE DESCRIPTION:

Pathology is the study of structural and functional abnormalities that are expressed as diseases of organs and systems. Traditionally, the discipline is divided into general pathology and systemic pathology; the former focuses on the fundamental cellular and tissue responses to pathologic stimuli, while the latter examines the particular responses of specialized organs.

Knowledge & understanding of pathology is essential for all doctors as this subject forms the bridge preclinical sciences & clinical subjects and it involves the investigation of the causes (etiology) of disease as well as the underlying mechanisms (pathogenesis) that result in the presenting signs and symptoms of the patient.

In MED III & IV the pathological basis of all diseases is thought which will help student in rational treatment of patients.

COURSE OBJECTIVES:

By the end of the course, the medical student will be able to:

a. Knowledge (theory)

1. Correlate normal & altered morphology (gross & microscopy) of different organ systems in different diseases to the extent needed for understanding of diseases processes & their clinical significance.
2. Have knowledge of common immunological disorders & their resultant effect on the human body.
3. Have a good understanding of the common hematological disorders & the various investigations necessary to diagnose them & various factors determine the prognosis.
4. Know the principles of collection, handling & dispatch of clinical samples from patients in a proper manner.
5. Perform & interpret in a proper manner the basic clinical pathology procedures.
6. Understand different types of bio-medical waste, their potential risks & their management.

b. **Skill (Practical in pathology)**

1. The students should be conversant with the organization & functioning of the laboratories & should be aware of the safety precautions to be taken in the laboratories.
2. Students should be conversant & be able to perform & interpret the routine laboratory investigations.
3. The students should be aware of the common methods of collection of samples for hematological & bio-chemical investigations & anticoagulants to be used. They should be conversant with the methods of collection of the body fluids for cytological examinations.
4. The clinic-pathological exercise includes the physical & chemical examination of the urine & the application of the tests in diagnosis of diseases.
5. The students should also be able to identify as spotters the common histopathological, hematological & cytological slides & specimens & charts & their interpretations.
6. The students should be able to correlate the history & identify common histopathological & hematological slides & discuss the relevant diagnosis.
7. The students should maintain the practical record book & keep it up-to-date & submit on time of valuation.

**INTENDED LEARNING OUTCOMES**

**Knowledge:**

1. Knowledge and understanding of the principles of Evidence Based Medicine.

2. Knowledge and understanding of the normal structure, function and development of the human body and mind at all stages of life. Knowledge and understanding of the genetic, developmental, metabolic, toxic, microbiologic, autoimmune, neoplastic, degenerative, and traumatic noxious e.ects on the body and mind.

3. Knowledge and understanding of the etiology, pathology, signs and symptoms, natural history, and prognosis of common mental and physical disorders in all age groups listed in the appendix and designed as “common”.

4. Knowledge and understanding of common diagnostic procedures, indications, contraindications and limitations. Knowledge of the appropriate use of laboratory techniques, hygiene and sanitization, asepsis, infection control and transmission.

5. Knowledge and understanding of the principles of health maintenance, education, prevention and screening. Knowledge and understanding of the epidemiology of
common diseases and conditions and systematic approaches in reducing the incidence and prevalence of those diseases.

6. Knowledge and understanding of molecular, biochemical, and cellular mechanisms of maintaining homeostasis.

7. Knowledge and understanding of the clinical presentation of the common (listed in appendix 1) diseases and conditions as well as immediately life-threatening injuries, cardiac, pulmonary, or neurological conditions regardless of etiology, and appropriate initial treatment.

8. Knowledge and understanding of the most frequent clinical, laboratory, roentgenologic, and pathologic manifestations of common diseases.

9. Knowledge and understanding of the need and value of consultations and referrals. Knowledge and understanding of the ways of continuous improvements, self-reflection, critical self-appraisal and lifelong learning.

**skills**

1. The ability to formulate an appropriate differential diagnosis. The ability to interpret and integrate the history and physical examination findings to arrive at an appropriate diagnosis or differential diagnosis.

2. The ability to formulate effective management plans (diagnostic, treatment, and prevention strategies) for diseases and other health problems. The ability to select the most appropriate and cost-effective diagnostic procedures.

3. The ability to perform routine technical procedures specific to the medical specialty. Perform practical exercises that entail accurate observation of biomedical phenomenon and critical analyses of data.

4. The ability to apply Evidence Based Medicine principles to clinical decision making.

5. The ability to critically appraise the medical literature.

**Attitude and behavior**

1. The ability to seek help, when needed, to deal with academic, personal, or interpersonal problems.

2. The ability to consistently and dependably carry out one’s duties with honesty, personal integrity, self-motivation, and self-discipline. A willingness to monitor the behavior and competence of professional peers and to deal appropriately with inadequate or unethical behavior, evidence of impairment, unprofessional practices, or conflict of interest.
3. Recognize the need to engage in lifelong learning and the commitment to engage in lifelong learning in order to maintain sufficient familiarity with scientific advances to ensure they are integrated appropriately with patient care.

4. The ability to recognize personal educational needs, to select and utilize appropriate learning resources, apply principles of evidence based medicine, the capacity to recognize and accept limitations in one’s knowledge and clinical skills, and a commitment to continuously improve one’s knowledge and ability.

5. The ability to demonstrate personal responsibility, reliability, dependability, open-mindedness, and curiosity.

6. Effective communication skills: besides English language proficiency, to demonstrate the capability to utilize verbal and non-verbal communication specific to culture, gender, and patient understanding.

7. At the end of the year the student should be able to utilize the services of a clinical laboratory in the diagnosis and management of a clinical case.

8. Do correct interpretation of laboratory investigation in the differential diagnosis.

9. Should be able to understand a laboratory report and explain it to the patient.

10. Be aware of lab safety, biomedical waste disposal, handling of specimen in taking care of the self and patients and other personnel.

11. Be able to understand ethical practices.

12. Be able understand the procedures like PAP smear which is used for screening to prevent cancer.

13. Be able to utilize blood bank services its ethical aspects, pros and cons of transfusion.

**STUDENT PERFORMANCE**

**Classroom behavior:**

Students are expected to comport themselves with dignity and respect for others (classmates and faculty). Demeanor in this class must follow the institution’s honor code and policies regarding cheating, plagiarism, and other misconduct (see Student Handbook). Infractions by students will be addressed appropriately in accordance with institutional policies.

**Attendance:**
Students must attend all lectures on a regular basis. Anyone with less than 80% attendance will lose 20% on a final exam for a first transgression and not be allowed to take a final exam (i.e., receive a grade of zero) on a subsequent infraction. Details and a fuller explanation of the institutional policies regarding attendance can be found in the Student Handbook.

**Policy on the Use of Electronics:**

Moodle is the mechanism for electronic communication between the faculty and students.

a) This includes professors posting assignments, announcements and information pertinent to the course (e.g., Powerpoint presentations, teaching aids, grades, etc.). Powerpoint slides for an upcoming lecture will be posted for student access prior to that presentation. These Powerpoint files are for the exclusive use of the students as a complement to the course and the information described in the book. That is, they are not for posting or distribution.

b) Students will use Moodle to submit assignments and can use it to submit questions to the faculty. This is by no means the sole basis for student-faculty interactions. Indeed, faculty members encourage students to talk with them in their office either in an in prompt or scheduled manner. Faculty have posted office hours.

c) Out of respect for each other and the professors, students may not communicate electronically during class with classmates, others, or the media without the explicit permission of the instructor. Furthermore, students may not record any part of the lecture or other proceedings without the explicit permission of the instructor. This includes audio and video recordings and photographs. If a student breaks any of these policies, his/her equipment may be confiscated for the remainder of the class, or the semester and more severe disciplinary action may be taken.

d) No electronic will be allowed for playing games, texting, facebooking, twitting, shopping or any related. Your computer, tablets and tabloids are only allow to follow the lecture or to look for answers. Any student found playing games, texting, facebooking, twitting, shopping or any related will be expelled from the course without discussion.

e) Any students found cheating on the test will be excused without any discussion, have a nice life.
SUMMARY OF COURSE CONTENTS:

<table>
<thead>
<tr>
<th>NO</th>
<th>CHAPTER</th>
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<tbody>
<tr>
<td>1</td>
<td>GENITOURINARY SYSTEM</td>
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<td>2</td>
<td>BLOOD VESSELS</td>
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<td>3</td>
<td>THE HEART</td>
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<td>4</td>
<td>THE LUNG</td>
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<td>5</td>
<td>HEAD &amp; NECK, THE EYE</td>
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<td>6</td>
<td>THE BREAST</td>
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<td>7</td>
<td>THE GASTROINTESTINAL TEACT, HEPATOBILIARY SYSTEM, AND THE PANCREAS</td>
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<tr>
<td>8</td>
<td>THE ENDOCRINE SYSTEM</td>
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<td>9</td>
<td>THE SKIN</td>
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<tr>
<td>10</td>
<td>MUSCULOSKELETAL SYSTEM</td>
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<tr>
<td>11</td>
<td>NERVOUS SYSTEM</td>
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</tbody>
</table>

DETAILS OF COURSE CONTENTS:

1. GENITOURINARY SYSTEM
   a. Clinical Manifestation of renal diseases
   b. Glomerular diseases
   c. Tubular and Intestinal diseases
   d. Vascular disease
   e. Congenital anomalies
   f. Cystic disease of Kidney
   g. Obstructive uropathy
   h. Urolithiasis
   i. Tumors of Kidney
j. The lower Urinary tract
   i. Ureters
   ii. Urinary bladder
   iii. Urethra

k. The male genital tract
   i. Penis
   ii. Testis & Epididymis
   iii. Prostate

l. The female genital tract
   i. Vulva
   ii. Vagina
   iii. Cervix
   iv. Body of uterus and endometrium
   v. Fallopian tubes
   vi. Ovaries
   vii. Gestational and placental disorders

2. BLOOD VESSELS
   a. The structure and Function of blood vessels
   b. Vessel development, Growth and remodeling
   c. Congenital anomalies
   d. Vascular wall cells and their response to injury
   e. Hypertensive vascular disease
   f. Arteriosclerosis
   g. Atherosclerosis
   h. Aneurysms & Dissection
   i. Vasculitis
   j. Raynaud phenomenon
   k. Veins & Lymphatics
   l. Tumors
   m. Pathology of vascular intervention

3. THE HEART
   a. Cardiac Structure and Specializations
   b. Effects of aging on the heart
   c. Heart disease: overview of pathophysiology
   d. Heart failure
   e. Congenital heart disease
   f. Ischemic heart disease
   g. Hypertensive Heart disease
   h. Valvular heart disease
   i. Cardiomyopathies
   j. Pericardial disease
   k. Tumor of the heart
   l. Cardiac transplantation
4. **THE LUNG**
   a. Congenital anomalies
   b. Atelectasis (Collapse)
   c. Pulmonary edema
   d. Acute lung injury & Acute respiratory distress syndrome
   e. Obstructive versus Restrictive pulmonary diseases
   f. Disease of vascular origin
   g. Pulmonary infections
   h. Lung transplantation
   i. Tumors
   j. Pleura

5. **HEAD & NECK, THE EYE**
   a. **Oral cavity**
      i. Teeth and supporting structure
      ii. Inflammatory/Reactive tumor like lesions
      iii. Infections
      iv. Oral manifestation of systemic diseases
      v. Tumors and precancerous lesions
      vi. Odontogenic cyst and tumors
   b. **Upper airways**
      i. Nose
      ii. Nasopharynx
      iii. Tumors of the nose, sinuses & nasopharynx
      iv. Larynx
   c. **Ears**
      i. Inflammatory lesions
      ii. Otosclerosis
      iii. Tumors
   d. **Neck**
      i. Branchial cyst (Cervical Lymphoepithelial cyst)
      ii. Thyroglossal Duct Cyst
      iii. Paraganglioma (Carotidbody tumor)
   e. **Salivary glands**
      i. Xerostomia
      ii. Inflammation (Sialoadenitis)
      iii. Neoplasms
   f. **Orbit**
   g. **Eyelid**
   h. **Conjunctiva**
i. Sclera
j. Cornea
k. Anterior Segment
l. Uvea
m. Retina & Vitreous
n. Optic nerve
o. The end stage eye: Phthisis Bulbi

6. THE BREAST
   a. The female breast
      i. Disorders of development
      ii. Clinical presentations of breast disease
      iii. Inflammatory disorders
      iv. Benign epithelial lesions
      v. Carcinoma of the breast
   b. The male breast
      i. Gynecomastia
      ii. Carcinoma

7. THE GASTROINTESTINAL TRACT, HEPATOBILIARY SYSTEM, AND THE PANCREAS
   a. Congenital Abnormalities
   b. Esophagus
      i. Esophageal obstruction
      ii. Esophagitis
      iii. Barrett esophagus
      iv. Esophageal tumors
   c. Stomach
      i. Acute gastritis
      ii. Chronic Gastritis and its complications
      iii. Hypertrophic gastropathies
      iv. Gastric polyps and tumors
   d. Small intestine & colon
      i. Intestinal obstruction
      ii. Ischemic bowel disease
      iii. Angiodysplasia
      iv. Malabsorption and Diarrhea
      v. Infectious enterocolitis
      vi. Irritable bowel syndrome
      vii. Inflammatory bowel disease
      viii. Other cause of chronic colitis
ix. Sigmoid diverticulitis
x. Polyps
xi. Familial syndrome
xii. Tumors of the anal canal
xiii. Hemorrhoids
xiv. Acute appendicitis
xv. Tumor of the appendix

e. Peritoneal cavity
   i. Inflammatory disease
   ii. Tumors

f. The liver
   i. General features of hepatic disease
   ii. Infectious disorders
   iii. Autoimmune disorders
   iv. Drug and toxin induced Liver disease
   v. Metabolic liver disease
   vi. Intrahepatic biliary tract disease
   vii. Circulatory disorders
   viii. Hepatic complications of organ or bone marrow transplantation
   ix. Hepatic disease associated with pregnancy
   x. Nodules and Tumors

g. The biliary tract
   i. Congenital anomalies
   ii. Disorders of the gallbladder
   iii. Disorders of the Extrahepatic bile ducts
   iv. Tumors

h. The pancreas
   i. Congenital anomalies
   ii. Pancreatitis
   iii. Non-Neoplastic Cysts
   iv. Neoplasms

8. THE ENDOCRINE SYSTEM
   a. Pituitary gland
      i. Clinical manifestation of pituitary glands
      ii. Pituitary adenomas and Hyperpituitarism
      iii. Hypopituitarism
      iv. Posterior pituitary syndrome
      v. Hypothalamic suprasellar tumors
b. **Thyroid gland**
   i. Hyperthyroidism
   ii. Hypothyroidism
   iii. Thyroiditis
   iv. Graves disease
   v. Diffuse and multinodular goiters
   vi. Neoplasm of the thyroid
   vii. Congenital anomalies

c. **Parathyroid glands**
   i. Hyperparathyroidism
   ii. Hypoparathyroidism
   iii. Pseudohypoparathyroidism

d. **The endocrine pancreas**
   i. Diabetes Mellitus
   ii. Pancreatic endocrine neoplasms

e. **Adrenal glands**
f. **Multiple Endocrine Neoplasia Syndromes**
g. **Pineal glands**

9. **THE SKIN**
   a. Introduction
   b. Disorders of pigmentation & Melanocytes
   c. Benign epithelial tumors
   d. Premalignant and malignant epidermal tumors
   e. Tumors of the dermis
   f. Tumors of cellular migrants to the skin
   g. Disorders of epidermal maturation
   h. Acute inflammatory dermatoses
   i. Chronic inflammatory dermatoses
   j. Blistering (Bullous) diseases
   k. Disorders of epidermal appendages
   l. Panniculitis
   m. Infection

10. **MUSCULOSKELETAL SYSTEM**
   a. **Bones**
      i. Bone modeling, remodeling & peak bone mass
      ii. Bone growth and development and its abnormalities
      iii. Fractures
      iv. Osteonecrosis (Avascular necrosis)
      v. Osteomyelitis
      vi. Bones Tumors and tumor like lesions
   b. **Joints**
i. Arthritis  
ii. Tumor and Tumor-like lesions  
iii. Soft tissue tumor and tumor-like lesions

11. NERVOUS SYSTEM
   a. General reactions of the motor unit  
b. Diseases of the peripheral nerve  
c. Disease of the skeletal muscle  
d. Cellular pathology of CNS  
e. Perinatal brain injury  
f. Trauma  
g. Cerebrovascular disease  
h. Infections  
i. Transmissible Spongiform Encephalopathies  
j. Demyelinating diseases  
k. Degenerative disease  
l. Genetic metabolic diseases  
m. Tumors  
n. Metastatic tumors, Paraneoplastic syndrome

TEACHING LEARNING METHODS:

The teaching learning activities during the pathology course will be carried out through

1. Lectures  
2. Practicals  
3. Tutorials  
4. Case based team work  
5. Integrated teaching  
6. Self directed learning

ASSESSMENT:

The assessment format consists of 5 main sections:

1. Attendance: Students must attend all lectures on a regular basis. Minimum of 80% attendance for every month is mandatory. Any student falling short of 80% attendance will not be allowed to take the exam.
2. Assignment
3. Practical
4. Quiz
5. Exam

Marks distribution of all assessment:

<table>
<thead>
<tr>
<th>ASSESSMENT</th>
<th>WEIGHTAGE %</th>
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<tbody>
<tr>
<td>Quiz</td>
<td>10</td>
</tr>
<tr>
<td>Midterm</td>
<td>30</td>
</tr>
<tr>
<td>Final</td>
<td>60</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
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</table>

- Each quiz is a 50 to 100 question exam, for 1 h to 2 h. and they are pop up quizzes
- Question are not limited to matching question, QMC, and clinical cases.
- The final exam is UP TO 100 question including pictures part, matching question, qmc and clinical cases to resolve.
- Each quiz OR any exam, will include the course material but not limited to question of clinical Anatomy, biochemistry, physiology, genetics, neuroanatomical, pharmacology, and embryology. These questions can giving as a pathological scenario or individual question.
- Each group will presenting a case, approved by the instructor, and this presentation will be graded and part of the assignments.

- Presentation will count at 10% credit at the end of the semester
- Presentation will be graded on a group behavior, how well the presentation is done, individual grading, how well you answered the question, how interactive the presentation is with the class.

GRADING:

- Grades will be based on the total assessment mark
- Final grade will be an aggregate of all the four exams & courseworks
- The grading scale is as follows:
<table>
<thead>
<tr>
<th>SCORE</th>
<th>GRADE</th>
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<tbody>
<tr>
<td>&lt; 60%</td>
<td>FAIL (F)</td>
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<tr>
<td>60-70%</td>
<td>D  Passing</td>
</tr>
<tr>
<td>70-79%</td>
<td>C</td>
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<tr>
<td>80-89%</td>
<td>B</td>
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<tr>
<td>90-100%</td>
<td>A</td>
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- If you are at 58% to 59% and did participated in class and showed interest, then might have an oral exam to catch up these 2% otherwise you will take the catch up exam.

**EXAMINATION SCHEDULE:**

a) **PATTERN:**

<table>
<thead>
<tr>
<th>TYPE OF QUESTIONS</th>
<th>MULTIPLE CHOICE, MATCHING (MCQs &amp; BAQs)</th>
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<tbody>
<tr>
<td>NO OF QUESTIONS</td>
<td>60-100</td>
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<tr>
<td>DURATION</td>
<td>1-2 HOURS</td>
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b) **CHAPTERS:**

<table>
<thead>
<tr>
<th>Midterm</th>
<th>1,6</th>
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<tbody>
<tr>
<td></td>
<td>2,3,4</td>
</tr>
<tr>
<td>Final</td>
<td>All chapters including MD3 curriculum</td>
</tr>
</tbody>
</table>

*CHAPTER ORDER MIGHT BE CHANGED, THE INSTRUCTOR WILL ANNOUNCE THE CHAPTER AFTER EACH LECTURE AND BEFORE EACH EXAMS AND QUIZZES*

c) **EXAM DATES:**

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<table>
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<tbody>
<tr>
<td>Mid term</td>
<td>June 22-25</td>
</tr>
<tr>
<td>Final exam</td>
<td>August 10-13</td>
</tr>
<tr>
<td>Retake</td>
<td>September 7-11</td>
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</table>

No catch up exam will be given for quizzes, midterm or final, so try your best to no missing them.
Any missed exam will be graded 0

Remediation Policy for Students Who Fail a Course: any student that will miss the course will have a comprehensive test on the date on the scheduled calender. Keep in mind it is not because that you are MD4 that you will not fail and redo the course.

RECOMMENDED TEXT BOOKS:

7. Bruce A. Fenderson, Review Of Pathology Illustrated Q&A, 2nd Ed, Lippincott Williams
8. Robert Groysman, Lange smart chart Pathology, Lange Medical Books/ McGraw-Hill
9. BRS Pathology (Board Review Series) Arthur S. Schneider MD (Author), Philip A. Szanto MD (Author)
10. First Aid for the USMLE Step 1 by Tao Le, Vikas Bhushan, and Deepak A. Rao
11. An Interactive Case Study Companion to Robbins Pathologic Basis of Disease is available online to registered HST students. This is a great resource for learning more and testing your knowledge about basic human pathology.


15. Pathology Secrets, 3e, Ivan Damjanov MD PhD


ONLINE RESOURCES:

1. http://sinoemedicalassociation.org/pathologylectures/ ask password
6. http://www.path.uiowa.edu (For Virtual Slides)
7. Medscape references
8. Pathology cases review: http://journals.lww.com/pathologycasereviews/pages/default.aspx
9. histology review: shotgun histology by Alexandra colesnicenco
10. https://www.youtube.com/watch?v=IQOkSF4rYrs&list=PLD7882068A01C370F
11. Pathguy.com the biggest pathology website
12. Any medical journal for cases.: News England journal of medicine with the Massachusetts’s pathology cases, Human Pathology,
**LECTURE SCHEDULE:**    Summer 2015

*This schedule might change. Any change will be announced.*

**May 14th July 2nd Holidays**

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<thead>
<tr>
<th>Wk</th>
<th>Day</th>
<th>DATE</th>
<th>CHAPTER</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>1</td>
<td>Tuesday</td>
<td>05/12</td>
<td>GENITOURINARY SYSTEM</td>
<td>DR. HAMMOUDI</td>
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<tr>
<td></td>
<td>Wednesday</td>
<td>05/13</td>
<td>GENITOURINARY SYSTEM</td>
<td>Dr. HAMMOUDI</td>
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<tr>
<td></td>
<td>Thursday</td>
<td>05/14</td>
<td>Holiday</td>
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<td>Friday</td>
<td>05/15</td>
<td>GENITOURINARY SYSTEM</td>
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<tr>
<td>2</td>
<td>Monday</td>
<td>05/18</td>
<td>GENITOURINARY SYSTEM</td>
<td>Dr. HAMMOUDI</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>05/19</td>
<td>THE BREAST</td>
<td>Dr. HAMMOUDI</td>
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<td></td>
<td>Wednesday</td>
<td>05/20</td>
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<td></td>
<td>Thursday</td>
<td>05/21</td>
<td>Male reproductive</td>
<td>Dr. HAMMOUDI</td>
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<td></td>
<td>Friday</td>
<td>05/22</td>
<td>MALE REPRODUCTIVE</td>
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<td>3</td>
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<td>Subject</td>
<td>Professor</td>
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<tr>
<td>Wednesday</td>
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<tr>
<td>Thursday</td>
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<td>Dr. HAMMOUDI</td>
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<tr>
<td>Friday</td>
<td>05/30</td>
<td>ENDOCRINOLOGY</td>
<td>Dr. HAMMOUDI</td>
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<tr>
<td>Monday</td>
<td>06/01</td>
<td>ENDOCRINOLOGY</td>
<td>Dr. HAMMOUDI</td>
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<tr>
<td>Tuesday</td>
<td>06/02</td>
<td>ENDOCRINOLOGY</td>
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<tr>
<td>Wednesday</td>
<td>06/03</td>
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<td>Monday</td>
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<td>Heart</td>
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Any lecture that cannot be covered in class due to time constriction, is the responsibility of the student to cover it and would be tested on it.

**Step 1 Specifications***

**System**
- 25%–35% General principles
- 65%–75% Individual organ systems
  - hematopoietic / lymphoreticular
  - nervous/special senses
  - skin/connective tissue
  - musculoskeletal
  - respiratory
  - cardiovascular
  - gastrointestinal
  - renal/urinary
  - reproductive
  - endocrine
  - immune

**Process**
- 20%–30% Normal structure and function
- 40%–50% Abnormal processes
- 15%–25% Principles of therapeutics
- 10%–20% Psychosocial, cultural, occupational, and environmental considerations


NBME
General Principles 35%–40%
Cell Biology 1%–5%
Human Development and Genetics 1%–5%
Biology of Tissue Response 10%–15%
Multisystem Processes 5%–10%
Microbial Biology and Infection 1%–5%
Immune Responses 5%–10%
Organ Systems 60%–65%
Hematopoietic & lymphoreticular 5%–10%
Central & peripheral nervous 5%–10%
Skin & related connective tissue 5%–10%
Musculoskeletal 1%–5%
Respiratory 1%–5%
Cardiovascular 5%–10%
Gastrointestinal 5%–10%
Renal/urinary 5%–10%
Reproductive 5%–10%
Endocrine 1%–5%

Approximate Step 1 Equivalents

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