IM 655
Nephrology Clerkship
Selective/Elective Clerkship Rotation Syllabus

Osteopathic Medical Specialties
Mary Hughes DO
Chairperson, Instructor of Record

Mary Hughes DO
hughesm@msu.edu (100% for CLIFMS effort)
Course Director

Last updated: 1-1-2015

For all questions regarding content or administrative aspects of this course, contact

Steven Stone
stonest@msu.edu
Department Course Coordinator

MSUCOM constantly strives to improve and advance its curriculum through innovation while assuring compliance with current AOA accreditation standards. While major changes are generally instituted at the beginning of each academic year, minor changes may be implemented semester to semester.

Please be mindful of the need to read your syllabi before beginning your rotations.
**General Description**

This course is designed to provide the student with an opportunity to actively engage in patient-based, learning experiences under the guidance of a faculty member (preceptor) in collaboration, as appropriate, with residents and/or fellows.

Rotations are typically two week, 3 credit hours or four week, 6 credit hours in duration. Timeframes for each rotation are decided at least 30 days prior to the beginning of the rotation.

The overall performance of course participants will be evaluated through customary assessment instruments normally employed by the department for core rotations, at the discretion of the instructor of record.

**Educational / Instructional Goals & Objectives**

Course participants will:

A. Develop an appreciation of the practice of nephrology as related to the specialty of the preceptor.

B. Assimilate what they learn and demonstrate their understanding of patient-care through ongoing interaction and dialogue with, as well as formative feedback from, the preceptor.

C. Demonstrate an understanding of the (seven) osteopathic core competencies (as applicable).

1. **Educational Goals:** The nephrology rotation is intended to provide the student with experience in the evaluation and treatment of a range of kidney and urinary tract clinical problems. The clinical experience is intended to emphasize the diagnosis and management of acute and chronic kidney and urologic tract diseases and the management of risk factors associated with the diseases. Learning objectives focus on the complete and accurate patient history and physical examination, indications for appropriate diagnostic studies, and the understanding of first line therapy for common nephrology diseases.

**EDUCATIONAL GOALS**

The nephrology rotation is intended to provide the student with hands on experience in the evaluation and treatment of various conditions related to nephrology.

The clinical experience will emphasize the diagnosis and management of acute and chronic renal diseases and the management of risk factors associated with the diseases.

Learning objectives highlight the complete and accurate patient history and physical exam, indications for appropriate diagnostic studies and the understanding of first line therapy for common renal conditions.
NEPHROLOGY COMPETENCIES/OBJECTIVES

A. **CLINICAL EVALUATION OF KIDNEY FUNCTION**

1. Define and describe the importance of the glomerular filtration rate (GFR) in the setting of normal kidney function and compromised kidney function

2. Be familiar with how to calculate the GFR using various mathematical equations

3. Describe the role of serum creatinine, creatinine clearance and blood urea nitrogen (BUN), in regards to proper kidney function

4. Explain how to interpret a dipstick urinalysis and urine microscopy
   a. Recognize the pathophysiology and conditions associated with various urine casts

5. Define hematuria and review the proper work-up of hematuria

6. Be familiar with how to quantify proteinuria and the proper work up of proteinuria

7. Explain the various imaging studies used to assess kidney function

8. Review the indications, risks and benefits of a kidney biopsy

B. **FLUIDS AND ELECTROLYTES**

1. Define osmolality and be familiar with how to calculate the plasma osmolality

2. Be familiar with how to calculate the osmolal gap and explain its significance

3. Define **hyponatremia** and the various risk factors for hyponatremia

4. Review the approach to the patient with hyponatremia using plasma osmolality, urine osmolality, and volume status

5. Review the treatment of acute and chronic hyponatremia

6. Define **hypernatremia** and its associated risk factors

7. Review the approach to the patient with hypernatremia

8. Differentiate between **central and nephrogenic diabetes insipidus** with regard to pathophysiology, diagnosis and treatment

9. Define **hypokalemia** and review the mechanism, causes and proper evaluation of hypokalemia

10. Describe the clinical manifestations and treatment of hypokalemia

11. Define hyperkalemia and review the mechanism, causes and proper evaluation of hyperkalemia
12. Describe the clinical manifestations and treatment of hyperkalemia

13. Review hypophosphatemia and hyperphosphatemia with regard to its pathophysiology, causes, evaluation and proper treatment

C. ACID BASE DISORDER

1. Review how to interpret arterial blood gases and be able to classify each condition as acidosis or alkalosis, respiratory or metabolic and acute or chronic
   a. Be familiar with the expected compensation of each of these conditions

2. Review the causes, clinical manifestations and proper evaluation of metabolic acidosis
   a. Be familiar with the role of the anion gap, how to calculate it and the conditions associated with a high and low anion gap
   b. Be familiar with how to calculate the urine anion gap and be able to interpret its value
   c. Review the causes of normal anion gap metabolic acidosis and anion gap metabolic acidosis

3. Review the causes, clinical manifestations and proper evaluation of metabolic alkalosis
   a. Differentiate between saline-responsive and saline resistant metabolic alkalosis using the effective arterial blood volume and urine chloride

4. Review the causes, clinical manifestations and proper evaluation of respiratory alkalosis
   a. Review the acute and chronic compensations
   b. Briefly discuss the treatment of respiratory alkalosis

5. Review the causes, clinical manifestations and proper evaluation of respiratory acidosis
   a. Review the criteria for acute and chronic respiratory acidosis
   b. Briefly discuss the treatment of respiratory acidosis

D. HYPERTENSION

1. Review the epidemiology and risk factors associated with HTN

2. Be familiar with the current JNC7 guidelines for normal blood pressure, prehypertension, stage 1 HTN and stage 2 HTN

3. Review the pathogenesis and management of essential HTN

4. Review the incidence, pathophysiology, risk factors and management of secondary HTN including
   a. Kidney disease
   b. Primary Aldosteronism
c. Renovascular HTN
d. Pheochromocytoma

5. Understand the characteristics of white coat HTN and be familiar with its management

E. **TUBULOINTERSTITIAL DISORDERS**

1. Review the pathophysiology, clinical manifestations, diagnosis and evaluation of the various tubulointerstitial diseases

2. Review the various causes of tubulointerstitial diseases including:
   a. Immunologic
   b. Infectious
   c. Malignancy
   d. Medications
   e. Metabolic factors
   f. Obstruction

3. Discuss the proper management of tubulointerstitial diseases

F. **GLomerular Disease**

1. Review the pathophysiology and clinical manifestations of glomerular diseases

2. Differentiate between the nephrotic and nephritic syndrome

3. Review the conditions that cause the nephrotic syndrome with regard to the pathophysiology, diagnosis, clinical manifestations and management
   a. Minimal Change disease
   b. Focal Segmental Glomerulosclerosis
   c. Membranous Nephropathy
   d. Secondary causes including diabetic nephropathy, amyloidosis, multiple myeloma and HIV

4. Review the conditions that cause the nephritic syndrome with regard to the pathophysiology, diagnosis, clinical manifestations and management
   a. IgA Nephropathy
   b. Membranoproliferative Glomerulonephritis
   c. Hepatitis C and B Virus associated kidney disease
   d. Poststreptococcal Glomerulonephritis
   e. Lupus nephritis
   f. Anti-Glomerular Basement Membrane Antibody Disease
   g. Small and Medium Vessel Vasculitis
   h. Thrombotic Microangiopathy

G. **Acute Kidney Injury**

1. Describe the characteristics/criteria of acute kidney injury (AKI)

2. Discuss the clinical manifestations and proper evaluation of AKI
   a. Be familiar with how to calculate the fractional excretion of sodium (FE\text{Na}) and its implication
3. Be familiar with the following classifications of AKI with respect to pathophysiology, risk factors, prevention and treatment
   a. Prerenal Azotemia
      i. Volume depletion
   ii. Hypotension
   b. Intrarenal Disease
      i. Acute Tubular Necrosis
      ii. Contrast Induced nephropathy
      iii. Rhabdomyolysis and pigment nephropathy
      iv. Acute interstitial nephritis
   c. Postrenal Disease
      i. Obstruction

4. Briefly review the pathophysiology, criteria and treatment of
   a. Cardiorenal syndrome
   b. Hepatorenal syndrome

**H. KIDNEY STONES**

1. Discuss the pathophysiology and epidemiology of kidney stones
2. Discuss the clinical manifestation and proper diagnosis of kidney stones
3. Review the risk factors and prevention of the following types of stones
   a. Calcium Oxalate stones
   b. Struvite stones
   c. Cystine stones
   d. Uric Acid stones
4. Discuss the proper management of kidney stones both in the acute and chronic setting

**I. CHRONIC KIDNEY DISEASE**

1. Define chronic kidney disease (CKD) and be familiar with its various stages
2. Review the pathophysiology and epidemiology of CKD
3. Review the screening protocols for patients at high risk of CKD
4. Explain the clinical manifestations and proper evaluation of CKD
5. Discuss the pathophysiology, risks and management of the complications of CKD including:
   a. Cardiovascular
   b. Anemia
   c. Chronic kidney disease and mineral and bone disorders
      i. Renal osteodystrophy
6. Explain the role, indications, and various types of dialysis
   a. Discuss the common complications associated with dialysis
7. Be familiar with the role of kidney transplantation in the patient with CKD
2. Competencies/Objectives

I: Medical Knowledge: The student is expected to be able to describe the clinical presentation, pathophysiology and management of the following nephrology issues:

A. Acute kidney injury
B. Chronic kidney disease
C. Fluid and electrolyte disturbances
D. Hemodialysis, peritoneal dialysis

II: Clinical Skills

A. The student should complete a thorough medical history including details of current symptoms, previous nephrology issues and management efforts, and risk factors that could impact on the diagnosis or management of their current problem.

B. Perform a complete physical exam with appropriate emphasis on the genitourinary system exam.

C. Interpret common diagnostic tests utilized in the evaluation of the patient with a kidney or urinary tract disorder.

D. Interpret laboratory test with emphasis on the CBC, BUN, Cr, serum and urine electrolytes, serum and urine osmolarity, fluid status

III: Socioeconomic: The student will:

A. Appreciate the psychosocial issues that potentially impact the patient’s nephrologic problems (professionalism and sensitivity to disability issues).

Assessment of Clinical Competencies:

1. Patient Care: The student will be able to complete an accurate history and physical exam and accurately document the findings, write daily notes to accurately and concisely project the status of the patient’s condition, and recognize unstable patients in need of urgent evaluation and management.

2. Medical Knowledge: The student can demonstrate knowledge of the criteria for diagnosis of common clinical problems, know the first line therapies for common clinical problems, and demonstrate a knowledge of the interpretation of diagnostic tests.

3. Communication Skills: The student can effectively present the clinical evaluation of a new patient and/or the clinical progress of a continuing patient, and communicate effectively with patients, clinical support staff, and supervising residents and attending physicians.

4. Professionalism: The student will demonstrate respect for patients, families, co-workers, and work effectively with nurse coordinators, social services, and ancillary staff.
5. Practice Based Learning: The student will be able to identify and discuss appropriate, evidence based approaches to assist in the diagnosis and management of clinical problems encountered in their patients.

6. Systems Based Practice: The student will be able to incorporate a team approach in the management of complicated patients.

7. Osteopathic Principles and Practices: The student should be able to integrate osteopathic principles and treatments in the management of the nephrology patient.

Teaching Methods:

The student is expected to function as a viable member of the supervising physician health care team. Assigned student responsibilities can include:
- supervised first patient contact in the office or clinic,
- the completion of admission history and physicals,
- the completion of pre-rounding progress notes on assigned patients,
- participation in conducting and the interpretation of diagnostic testing and clinical management.

Participation in Clinical Conferences and/or Structured Educational Programs: The student is expected to participate in clinical conferences and educational programs appropriate for the clerkship course including those generally associated with residency educational programs.

Evaluation: The student is encouraged to solicit feedback related to his/her clinical performance on a daily basis. The student should receive formative performance evaluations at the mid-point and end of the rotation that outlines faculty perceived strengths and weaknesses related to the student’s performance that includes recommendations for strengthening his/her performance as warranted.

Reference Materials

Review of the Nephrology Modules from the Genitourinary coursepack will be of value to the student. There is no assigned textbook. Reading assignments are under the purview of the preceptor.

Student Responsibilities

Course participants will meet the preceptor on the first day of the rotation at a predetermined location to be oriented to rotation hours, location(s), and expected duties and responsibilities while on-service.
<table>
<thead>
<tr>
<th>Requirements</th>
<th>Submission Method</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending Evaluation of Rotation</td>
<td>To be appropriately submitted per the instructions at the end of each evaluation form</td>
<td>Final Day of Rotation</td>
</tr>
<tr>
<td><em>the determination of a satisfactory attending evaluation is governed by the University’s Policy for Retention, Promotion, and Graduation</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Evaluation of Rotation</td>
<td>“Evaluate” Link in Kobiljak Schedule (this link will activate on the final Monday of the rotation)</td>
<td>11pm Last Sunday of Rotation</td>
</tr>
<tr>
<td>Patient Types and Procedure Log</td>
<td>See page 13 at end of syllabus and upload into D2L dropbox for the course</td>
<td>11pm Last Sunday of Rotation</td>
</tr>
<tr>
<td>Clinical Shift Schedule</td>
<td>Online D2L Drop Box if you have access to a scanner -or- Mail to: MSUCOM, Dept. of OMS ATTN: Steve Stone 909 Fee Rd., B315A West Fee Hall East Lansing, MI 48824</td>
<td>11pm Last Sunday of Rotation</td>
</tr>
</tbody>
</table>

**IM 655 Nephrology Corrective Action Policy**

There is no Corrective Action Policy or Plan as there are no graded components to the IM 655 rotation. All items with the exception of the attending evaluation are under the direct control of the student and there is no reason that they cannot be completed in a timely fashion. If the student has an extension in the rotation due to some verifiable reason, then they will receive this same extension for submitting the required end of rotation paperwork.

**IMPORTANT NOTE:** Attending Evaluations do not follow the above “Corrective Action” process. Marginal Attending Evaluations will be reviewed on a case-by-case basis by the department, where the Instructor of Record will then determine whether to give the students a Pass or an N grade for the rotation. If the department determines students will be given an N grade in light of the evaluation, they will then proceed to “Remediation Policy” process.
Unsatisfactory Clinical Performance

A student's clinical performance will be assessed through the Attending Evaluation. A satisfactory Attending Evaluation is required for completion of the clinical requirements for the course.

Unsatisfactory Attending Evaluations are governed by the Policy for Retention, Promotion and Graduation. Evaluations with below average scores in two or more categories defined as rankings of Needs Improvement/Unsatisfactory (on a scale of Needs Improvement/Unsatisfactory-Exceptional) or 3 and below (on a numerical scale of 1-7) will be referred to the Department Chairperson/Instructor of Record for review and grade determination.

Any student with two or more marginal evaluations will be referred to the COSE Clerkship Performance Subcommittee for review.

**IMPORTANT NOTE:** The student will maintain an “Extended” (ET) grade until they have successfully completed all academic and clinical requirements for the course.

“N” Grade and Remediation

http://com.msu.edu/Students/Policies_and_Programs/Remediation_Policy.htm

A student who receives an “N” grade will be required to appear before the Committee on Student Evaluation (COSE) Clerkship Performance Subcommittee for review of the student’s overall performance. The Subcommittee may recommend that the student who has received an "N" grade be permitted to remediate the “N” grade (see below) or academically dismissed. If a student is recommended for dismissal, the student will appear before COSE to have their status in MSUCOM determined. COSE will review the student’s academic/clinical performance; determine whether dismissal is appropriate or if the student’s circumstances warrant an opportunity for continuation in the curriculum. The student’s eligibility to remediate will be determined following this COSE decision.

Remediation is the method by which course objectives will be met after receiving an "N" grade. Remediation will be offered only after the student’s eligibility for remediation has been determined.

To successfully remediate an “N” grade, a student must demonstrate mastery of the course objectives. To do this the student may be required to retake the course or enroll and participate in a College directed study course demonstrating successful mastery of the course objectives.

Upon remediation of the “N” grade, the original "N" grade remains on the permanent transcript along with the grade, “P” or “N,” for the remediation experience.
MSU College of Osteopathic Medicine Standard Policies

The following are standard MSUCOM policies across all Clerkship rotations.

ATTENDANCE POLICY

Attendance at all scheduled Clerkship activities is mandatory.

If a student is unable to be present for a scheduled clerkship activity because of extenuating circumstances, the student is required to complete a Clerkship Excused Absence Request form. In all cases except for emergencies or sudden illness, requests for scheduled absences are to be submitted at least 30 days prior to the date(s) of absence. Absences are not approved until the form is completed with all required signatures. Once approved, the student is required to notify their preceptor of their absence within 24 hours. Failure to complete this form or obtain required signatures will result in an unexcused absence from the rotation. Unexcused absences are considered unprofessional behavior and could be noted as a mark of unprofessionalism on the student's performance evaluation, and may lead to failure of the rotation.

An absence request for the first or last day of the rotation will be denied. All absences (excused or unexcused) must be made up as specified on the Excused Absence Form as outlined under the conditions of approval. Makeup experience will be determined by the Director of Medical Education and may include additional clinical day(s) or written assignment(s).

If a student has an emergency or sudden illness they should immediately notify the Director of Medical Education and rotation preceptor. The excused absence request form must be submitted to the Medical Education Office within 24 hours of the original emergency or sudden illness notification.

STATEMENT OF PROFESSIONALISM

Principles of professionalism are not rules that specify behaviors, but guidelines that provide direction in identifying appropriate conduct. These principles include the safety and welfare of patients, competence in knowledge and skills, responsibility for consequences of actions, professional communication, confidentiality, and lifelong learning for maintenance of professional skills and judgments. Professionalism and professional ethics are terms that signify certain scholastic, interpersonal and behavioral expectations. Among the characteristics included in this context are the knowledge, competence, demeanor, attitude, appearance, mannerisms, integrity and morals displayed by the student to faculty, peers, patients and colleagues in other health care professions. Students are expected to conduct themselves at all times in a professional manner and to exhibit characteristics of a professional student.

STUDENTS RIGHTS AND RESPONSIBILITIES

Each individual student is responsible for their behavior and is expected to maintain standards of academic honesty. Students share the responsibility with faculty for creating an environment that supports academic honesty and principles of professionalism. Proper relationship between faculty and student are fundamental to the college's function and this should be built on mutual respect and understanding together with shared dedication to the education process. It is a fundamental belief that each student is worthy of trust and that each student has the right to live in an academic environment that is free of injustice caused by dishonesty. While students have an obligation to assist their fellow students in meeting the common goals of their education, students have an equal obligation to maintain the highest standards of personal integrity.
FACULTY RESPONSIBILITIES

It is the responsibility of the college faculty to specify the limits of authorized aid (including but not limited to exams, study aids, internet resources and materials from senior students) in their syllabi, and it is the responsibility of students to honor and adhere to those limits. Course instructors shall inform students at the beginning of the semester of any special criteria of academic honesty pertinent to the class or course.

It is the responsibility of the clinical faculty to provide students with ongoing feedback during rotation upon request. Clinical faculty are generally recommended (though not required) to limit student assigned duty hours from 40 to 60 hours weekly (and not exceeding 60 hours). Both faculty and students are to be treated fairly and professionally in order to maintain a proper working relationship between trainer and trainee.

COURSE GRADES

- **P-Pass** – means that credit is granted and that the student achieved a level of performance judged to be satisfactory according to didactic and clinical performance by the department.
- **N-No Grade** – means that no credit is granted and that the student did not achieve a level of performance judged to be satisfactory according to didactic and clinical performance by the department.
- **ET-Extended Grade** – means that a final grade (“Pass” or “No Grade”) cannot be determined due to one or more missing course requirements. Once all course requirements have been completed, received, and processed, the ET grade will be changed to a final grade. An “ET” will NOT remain on a student’s transcript.

ROTATION EVALUATIONS

**Attending/Faculty/Resident Evaluation of Student**

Students are responsible for assuring that his/her clinical supervisor receives the appropriate evaluation form. Forms can be accessed via the “Attending Evaluation” link in the student’s Kobiljak online Clerkship schedule.

Students should assertively seek feedback on his/her performance throughout the course of the clinical rotation. Students should also sit down and discuss the formal evaluation with the clinical supervisor.

Students should keep a copy of the evaluation and turn the original in to the “Office of the Registrar” upon their return from the rotation. Any evidence of tampering or modification while in the possession of the student will be considered “unprofessional behavior” resulting in an “N” grade and review by the Committee on Student Evaluation (COSE) and/or the College Hearing Committee.

Grades are held until all rotation requirements, including evaluation forms, are received. Be sure you are using the correct form.

**Student Evaluation of Rotation**

Students will submit their rotation evaluations electronically at the conclusion of every rotation by accessing their online schedule through Kobiljak.

EXPOSURE INCIDENTS PROTOCOL

A form has been developed by the University to report exposure incidents. While on rotations that may occur outside of the base hospital system notify your attending immediately of any exposure and follow the MSU procedure for evaluation and treatment. You can access the form at [www.com.msu.edu/AP/clerkship_program/clerkship_documents/exposure.pdf](http://www.com.msu.edu/AP/clerkship_program/clerkship_documents/exposure.pdf). Please make yourself familiar with the procedure and the form.
Patient Types and Procedure Log

<table>
<thead>
<tr>
<th>Procedure</th>
<th>#Required</th>
<th>Pt. Initials</th>
<th>Date</th>
<th>Supervisor Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate 2 patients with acute kidney injury</td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate 2 patients with electrolyte disturbances</td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpret 10 BUN/Cr and electrolyte sets to assess for acute or chronic kidney disease</td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participate in five Nephrology consults in the hospital or office.</td>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>