Standardized Course/Section Syllabus:

Johns Hopkins University
School of Medicine

Foundations of Clinical Reasoning

Course Director:
Susrutha Kotwal, MD, FHM
Phone: 410-550-5018 (O), 570-867-2288 (C)
Email: skotwal1@jhmi.edu
Times: 9am - 5pm (Mon-Fri)

Small Group Facilitators/Course Faculty:
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Ishaan Gupta, MD - igupta4@jhmi.edu
Milad Memari, MD - mmemari1@jhmi.edu

Class Schedule:

A total of 10 hours of zoom video conferences in a week.
Asynchronous sessions: Readings + PowerPoint slides + Videos to watch (will be posted on Blackboard)
Synchronous zoom sessions:
A total of 10 participants for the entire week.
Each zoom conference will be 60 minutes in duration.

******Note - times below aren’t final. Can be modified depending on instructors’ and students’ availability******
Course Description:

Clinical reasoning involves establishing a diagnosis and developing a therapeutic plan that fits the unique circumstances and needs of the patient. (McBee et al., 2018)

The goal of the curriculum is to formally introduce medical students at JHUSOM to current concepts in clinical reasoning, diagnostic error, and to provide an opportunity to practice clinical-problem solving in a safe, learner-centered environment. Medical students currently get exposed to the concept of diagnostic reasoning during their clinical rotations, but this rotation will provide them with the ability to further explore and experiment with these concepts.

Students will also discuss both appropriate ordering and interpretation of diagnostic testing. They will be provided with a framework for honing their own diagnostic reasoning skills which they will in turn be able to translate to patient care.

This course will be a 1 week online elective available for medical students. We will use a combination of online material (video lectures, readings) and online zoom clinical problem-solving sessions with faculty facilitators.

Online readings and videos:

Prior to attending the zoom clinical problem-solving sessions students will review online articles, PowerPoint slides, and lectures (videos) so that they can be active participants in facilitated discussions.

Online zoom clinical problem-solving sessions:

Prior to each session, faculty will post clinical cases on Blackboard for each group. Students will be expected to review the case for their session and think about responses to the questions posted in the cases. This will help students contribute to the discussions during the zoom sessions. At a predetermined date and time, faculty and students will connect via zoom. To maximize faculty to
student ratio, we will limit to 10 participants per week. During the zoom session, students will work to solve clinical cases facilitated by the faculty. Faculty will present the clinical case and pause intermittently to allow students to ask questions and generate discussions. Students will be expected to “think out loud” their clinical reasoning in a safe, learner-centered environment to practice clinical-problem solving. This will be an interactive session and faculty will provide feedback to students on their clinical reasoning. Finally, faculty will summarize the case with teaching points and all participants will be asked to reflect on the case and share their thoughts with the group.

Time allotted per session: 60 minutes.

Course Learning Objectives:

By the end of this course, students will be able to:

1. Define essential concepts in clinical reasoning
2. Describe causes of diagnostic error
3. Identify categories of cognitive bias
4. Apply Bayesian reasoning to solve clinical cases
5. Discuss the role of diagnostic uncertainty in clinical decision making

Required Text and Other Materials

Required readings:

1. Clinical Decision Making: An Emergency Medicine Perspective
2. Educational Strategies to Promote Clinical Diagnostic Reasoning
3. Tolerating Uncertainty — The Next Medical Revolution

Required videos:

1. Introduction to Clinical Reasoning and Diagnostic Errors: PowerPoint slides
2. Cognitive Errors and Biases: PowerPoint slides
3. Bayesian Reasoning: PowerPoint slides
5. Diagnostic Uncertainty
6. A series of educational videos created by The Society to Improve Diagnosis in Medicine (SIDM): [https://www.improvediagnosis.org/art/](https://www.improvediagnosis.org/art/)
7. A course on clinical reasoning created by Dr. Eric Strong: [https://www.youtube.com/playlist?list=PLYojB5NEEakX7NBjs24Vd1dZaeOus3Uju](https://www.youtube.com/playlist?list=PLYojB5NEEakX7NBjs24Vd1dZaeOus3Uju)
8. Clinical problem solving: https://www.youtube.com/watch?v=jq_KTIY5XJo&list=PLP08XsLK51Qxpz8Rp5hGH09_JTCBRoVAE

Assignments

There will be pre-course and post-course test cases (assignment) uploaded on Blackboard. Students will be expected to complete and submit the pre-course test cases prior to accessing the material on Blackboard.

After completion of the course, students will be expected to complete and submit the post-course test cases within 1 week of course completion date.

An outline for the written case scenarios:

Name:

Case:

Summary statement/Problem representation (1-3 sentences)

Prioritized differential diagnosis with explanation (include at least 3 options).
1.
2.
3.
4.
5

Plan with explanation (diagnostic work-up and/or therapeutic).
1.
2.
3.
4.

Evaluation and Grading

Evaluation Tool for Learner Assessment

Formative assessment:

After each zoom session, students will be evaluated by faculty using the following rubric.
Faculty will be expected to fill out an online evaluation form after each zoom session.

Rubric for feedback on zoom clinical problem-solving sessions:

Collaborative learning (adapted from: https://www.prosseracademy.org/ourpages/auto/2017/2/22/48162471/SpeakingListeningRubric.pdf)

<table>
<thead>
<tr>
<th>Domain</th>
<th>0 (absent)</th>
<th>1-2 (early development)</th>
<th>3-4 (medium development)</th>
<th>&gt; 5 (superior development)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking</td>
<td>No evidence</td>
<td>Participates in discussion expressing their own ideas</td>
<td>Initiates and participates in discussion expressing their own ideas clearly</td>
<td>Initiates and participates effectively, expressing their own ideas clearly, and provides evidence to be persuasive</td>
</tr>
<tr>
<td>Listening</td>
<td>No evidence</td>
<td>Responds to others, takes notes</td>
<td>Respond to different perspectives, referring to agreement and disagreement with others</td>
<td>Respond thoughtfully to different perspectives, summarizes points of agreement and disagreement with others, builds on others’ ideas</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>No evidence</td>
<td>Responds to questions, shares their own views</td>
<td>Poses and responds to questions, shares their own views, clarifies concepts</td>
<td>Propels conversations by posing and responding to questions, connects to broader themes; clarifies, verifies, challenges own ideas using evidence</td>
</tr>
<tr>
<td>Culture of Learning</td>
<td>No evidence</td>
<td>Joins the discussions, acknowledges</td>
<td>Joins the discussion referring to</td>
<td>Joins the discussion by explicitly</td>
</tr>
</tbody>
</table>
Summative assessment:

1. Before and after completing the course, all students will be asked to fill out the following online evaluation form. To be completed within 1 week.

*Adapted from Duca & Glod, 2019*

**Clinical Reasoning Pre-Test**

*Indicate your level of understanding of the following concepts. 1=No Understanding 5=Full Understanding.*

*Circle "Not Aware" if you have never heard of this concept.*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>No Understanding</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Little Understanding</td>
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<td></td>
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<tr>
<td>Neither/Neutral</td>
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<tr>
<td>Some Understanding</td>
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<tr>
<td>Full Understanding</td>
<td></td>
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<tr>
<td><strong>System 1 and System 2 thinking</strong> (dual process)</td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Definition of diagnostic errors</strong> (NAM)</td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Biases in clinical reasoning</strong></td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Metacognition</strong></td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Illness scripts</strong></td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Clinical Reasoning Pre-Test</td>
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<tr>
<td><em>Indicate your level of confidence in performing the following skills. 1= Least Confident, 5=Most Confident. Circle &quot;Not Aware&quot; if you have never heard of this concept.</em></td>
<td></td>
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<tr>
<td>Least Confident</td>
<td>Little Confidence</td>
<td>Neither/ Neutral</td>
<td>Some Confidence</td>
<td>Most Confident</td>
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<tr>
<td>Utilize illness scripts to recognize a particular disease</td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Utilize semantic qualifiers to describe a patient complaint</td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Identify clinical findings that argue for or against your leading hypothesis</td>
<td>Not Aware</td>
<td>1</td>
<td>2</td>
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<td>4</td>
</tr>
<tr>
<td>Develop a prioritized differential diagnosis</td>
<td>Not Aware</td>
<td>1</td>
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<td>Developing a one to two sentence summary of a patients’ problem and key findings</td>
<td>Not Aware</td>
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<td>2</td>
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<td>4</td>
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<td>Utilize Bayesian reasoning to work through clinical cases</td>
<td>Not Aware</td>
<td>1</td>
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### Clinical Reasoning Post-Test

*Indicate your level of understanding of the following concepts. 1=No Understanding 5=Full Understanding. Circle "Not Aware" if you have never heard of this concept.*

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<td>2</td>
<td>3</td>
</tr>
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<td>Not Aware</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Diagnostic uncertainty</td>
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2. Prior to and after completing the course, students will be assigned test cases on Blackboard. Students will be expected to individually work through the cases and submit the answers to the questions posted in the case. Pre-course test cases to be completed prior to assigned readings on Blackboard. Post-course test cases to be completed within 1 week of the course end date. We will use the following rubric to grade the students:

Adapted and modified from Kotwal, Klimpl, Tackett, Kauffman, & Wright, 2019: https://www.journalofhospitalmedicine.com/jhospmed/article/202625/hospital-medicine/documentation-clinical-reasoning-admission-notes

Clinical Reasoning in Admission Note
Assessment & Plan (CRANAPL) Tool

1. **SUMMARY STATEMENT**
A concise summary statement that highlights the person and their presentation. Elements may come from 3 domains: (i) who the person is [age, gender, race…], (ii) past medical history, and (iii) information related to the incident hospitalization/presentation [details from the history, exam, and testing].

   0 = absent
   1 = one or two elements addressed
   2 = all three elements present

2. **LEADING OR MOST LIKELY DIAGNOSIS STATED AND EXPLAINED**
Explanation and reasoning for the leading diagnosis might include the following:
epidemiology, key features, risk factors

0 = leading diagnosis absent/not stated
1 = stated but no explanation
2 = stated and rationale / explanation noted

3. **CERTAINTY OR UNCERTAINTY EXPLICITLY ACKNOWLEDGED**
Writer alludes to confidence or uncertainty associated with the leading diagnosis (e.g. use of words like: probably, most likely, definitely, unsure).

0 – No 1 – Yes

4. **DIFFERENTIAL DIAGNOSIS (DDx) AND SUPPORTING RATIONALE**
Alternative diagnostic possibility(ies) listed and explanation of the reasoning of why they are being considered (e.g. reasons they fit, or do not fit, with the presentation or their likelihood relative to the leading diagnosis).

0 = absent (no DDx)
1 = DDx present but no explanation
2 = DDx present AND explanation described

5. **PLAN FOR DIAGNOSIS**
Delineation of the diagnostic plan and listing reason(s) for diagnostic testing.

0 = absent/not stated
1 = stated but no explanation
2 = stated and rationale / explanation noted

6. **PLAN FOR TREATMENT**
Description of the therapeutic plan and listing reason(s) for the treatments ordered.

0 = absent/not stated
1 = stated but no explanation
2 = stated and rationale / explanation noted

**TOTAL SCORE:**
NARRATIVE COMMENTS:

Evaluation Tool for Learner Feedback of the Course

All feedback provided by students will be anonymized.
Formative feedback:
    After participating in each zoom session, all students will be asked to reflect and answer
    the following questions on an online evaluation form (Stead, 2005):
    (1) What was the most important thing you learned in class today?
    (2) What question is unanswered?

Summative feedback:
After completing the course, all students will be asked to complete the following evaluation form online
Adapted from (Duca & Glod, 2019)

Please describe aspects of the course that you found to be most helpful for the development of
your clinical reasoning.

Please describe aspects of the course that were less helpful for your development of
clinical reasoning.

What suggestions do you have for improving the course?

Please include any additional feedback that you have for the course.

**Pass/Fail Grading Scale** (Grading scale is determined by the School of Medicine.)
P = Student must have an average equal to or exceeding 70% and/or must have met all required
assignments for the class.
F = Student has not completed all assignments, has failed significant required elements of
the course, or has an average score below the passing level for the course. Student should
meet with the course director to plan remediation.

**Expectations**
Students are expected to:

- Participate in discussions
- Communicate positively and constructively with your classmates
- Review the readings and video lectures prior to the zoom sessions
- Provide feedback about the course
- Complete evaluations/assignments
- Let the course director know immediately if you are having difficulties in the course

**Technical Difficulties**
Please contact the Office of Academic Computing for assistance.

**Professional Behavior Expectations during all Courses**
Students are expected to demonstrate professional behaviors as outlined in the JHU SOM Honor Code and in the AAMC subcompetencies on professionalism:
1. Demonstrate behaviors that show compassion, integrity, and respect for others
2. Demonstrate behaviors that show responsiveness to patient needs that supersedes self-interest
3. Demonstrate behaviors that show respect for patient privacy and autonomy
4. Demonstrate behaviors that show accountability to self, patients, colleagues, the profession, and society. [Link to Accountability Policy]

Course and Clerkship directors will communicate discipline specific expectations/tasks for which students will be held accountable. As with other Course/Clerkship domains such as knowledge and skills, students who deviate from these expectations, may have their final grade lowered, or a serious deviation may result in failure of the course/clerkship.

**Serious breaches of professionalism** should be expected to result in failure of the course/clerkship in which the breach is detected. These breaches will be handled on a case-by-case basis by the course/clerkship director in consultation with the Office of Medical Student Affairs and the Office of Curriculum. All such matters may also be referred to the Disciplinary Committee.

Examples of such unprofessional behaviors include but are not limited to: cheating, plagiarism, or other forms of academic dishonesty; forgery or falsification of documents/records; lying or misrepresentation of facts, figures, or clinical data; failure to obtain appropriate supervision for clinical care; physical violence, bullying or harassment against others, or other significant lapses in personal ethical conduct that raise concern regarding the moral character of the student in question.

**JHUSOM Policy on Attendance**
This course is heavily dependent on participation, if you need to miss a required session, you need to let the course leader and course coordinator know ahead of time. The JHUSOM policy on attendance in the curriculum is posted at [https://hpo.johnshopkins.edu/som/policies/886/39178/policy_39178.pdf](https://hpo.johnshopkins.edu/som/policies/886/39178/policy_39178.pdf).
Classroom Accommodations for Students with Disabilities
If you are a student with a documented disability who requires an academic adjustment, auxiliary aid or other similar accommodations, please contact the Office of Student Affairs at 410-955-3416. You must also notify the course director and course coordinator in advance of the start of the course and well in advance of any exam or assessment so that appropriate preparations can be completed before an event requiring accommodation.

Statement of Diversity and Inclusion
Johns Hopkins University is a community committed to sharing values of diversity and inclusion in order to achieve and sustain excellence. We believe excellence is best promoted by being a diverse group of students, faculty, and staff who are committed to creating a climate of mutual respect that is supportive of one another’s success.

Teacher Learner Conduct Policy
The Johns Hopkins University School of Medicine is committed to fostering an environment that promotes academic and professional success in learners and teachers at all levels. The achievement of such success is dependent on an environment free of behaviors, which can undermine the important missions of our institution. An atmosphere of mutual respect, collegiality, fairness, and trust is essential. Students should review the JHUSOM Guidelines for Conduct in Teacher/Learner Relationships https://hpo.johnshopkins.edu/som/policies/886/39186/policy_39186.pdf.

Student Honor Code
Students are reminded of the honor code developed by the medical student body, introduced in September 1991, is as follows:
As a student at The Johns Hopkins School of Medicine, I pledge:

- To do my own work and be honest in my interactions with peers, faculty, and staff. This applies to my work on examinations, assignments, and papers as well as work in the laboratory.
- To uphold the high standard of conduct in patient care which has always been maintained by the Johns Hopkins medical community.
- To base my interactions with other students on mutual respect and cooperation.
- To act on infractions of the honor code and to maintain the confidentiality of all parties involved.
- To encourage my peers to uphold this honor code.

It is the expectation that Hopkins students live by this code.

Course Evaluation
Please remember to complete the course evaluation for this course. For preclerkship courses, evaluations will be required from a rotating sample of 25% of the class. Other students will always have the option of submitting an evaluation if they choose. This will reduce the overall burden of surveys for students. There will be no extra credit for completing the evaluation. If you are in the designated 25%, you will receive an incomplete if the course evaluation is not completed by the time grades are posted for the course.
Course evaluations are an important tool in the School of Medicine’s ongoing efforts to improve instructional quality and strengthen its programs. The results of the course evaluations are kept anonymous — your instructor will only receive aggregated data and comments for the entire class.

For the clinical clerkships and clinical electives, 100% of the students are expected to complete the course evaluations.

References:


