Instructional Mode: Blended (asynchronous and face-to-face)

Credit Hour Requirement: The credit standard for this course is met by an expectation of a total of 90 hours of student engagement with the course learning activities (at least 45 hours per credit), which include reviewing asynchronous didactic content, performing point of care ultrasounds in the emergency department of patient volunteers, observing traumatically injured patient resuscitation in the emergency department and reviewing point of care ultrasounds.

Course Hours:

<u>Didactic Material</u>: 21 hours

The course will begin with students appreciating the anatomic structures of the thorax and abdomen with a focus on the relationship of visceral organs to one another, fascial planes and potential spaces. The didactic materials will provide important anatomy content review, developed and recommended by SMPH Anatomists. The point of care ultrasound material includes educational lectures developed by SMPH emergency medicine faculty, as well as an e-book developed by national leaders in the point of care ultrasound community. Finally, a series of landmark articles are included for students to better understand the benefits and limitations of the e-FAST exam. Students will review the anatomy didactic material asynchronously prior to performing ultrasounds. The anatomy content will be reinforced throughout their rotation, as they visualize anatomical structures on ultrasound.

E-book Human Anatomy for Physician Assistant students (by Dr. Karen Krabbenhoft)
- Unit 1 (Thorax) and Unit 2 (Abdomen and Pelvis)

Clinically Oriented Anatomy, Moore and Dailey, 7th edition
-Thorax and Abdomen Chapters

Point of care ultrasound lectures (by Drs. Damewood, Resop, and Schnittke)
-eFAST exam and basic ultrasound physics

Introduction to Bedside Ultrasound, Malin and Dawson, 2nd Edition (E-book)
-FAST and lung chapters

E-FAST articles

1. Gentry Wilkerson, R. and Stone, M. B. (2010), Sensitivity of Bedside Ultrasound and Supine Anteroposterior Chest Radiographs for the Identification of Pneumothorax After Blunt Trauma. Academic Emergency Medicine, 17: 11–17
2. Akoglu H et al. Diagnostic accuracy of the EFAST performed by emergency physicians compared to computed tomography. AJEM. 2017
3. Blackbourne LH et al. Secondary ultrasound examination increases sensitivity of the FASt exam in blunt trauma. Journal of Trauma and Acute care surgery. 2004, 57 (5): 934-938
4. Bahner D, et al AIUM practice guidelines for the performance of the FAST exam. JUM 2008. 27 92) 313-318.
5. Fox, J. C et al, Test Characteristics of Focused Assessment of Sonography for Trauma for Clinically Significant Abdominal Free Fluid in Pediatric Blunt Abdominal Trauma. Academic Emergency Medicine, 2011 18: 477–482.
6. Montoya, J., Stawicki, S.P., Evans, D.C. et al. From FAST to eFAST: an overview of the evolution of ultrasound based trauma assessment. Eur J Trauma Emerg Surg (2016) 42: 119 -124
7. Abboud, Paul-André C et al. Emergency department ultrasound for hemothorax after blunt traumatic injury. Journal of Emergency Medicine , Volume 25 , Issue 2 , 181 – 184
8. Jehle, Dietrich Von Kuenssberg, Stiller, G and Wagner D. "Sensitivity in detecting free intraperitoneal fluid with the pelvic views of the FAST exam." *The American journal of emergency medicine* 21.6 (2003): 476-478.

Total experiential learning hours: 69
Practice eFAST and observe clinical use of eFAST in the ED: 5-7 hours over 10 days = 62 hours
Small group image review sessions with faculty: 7 hours
Total asynchronous didactic hours: 21 hours
Total course hours: 90 hours
Total faculty and student interaction time: 35 hours
This includes 14 hours of in person didactics via dedicated 1:1 bedside teaching (7 hours) and image review (7 hours), as well as orientation (1 hour), direct supervision of student while in ED (18 hours), and testing (2 hours).

Planned Sessions:
Students will review anatomy didactic material asynchronously prior to scanning. The students will then visualize these same structures via sonography in the Emergency Department. Thus, anatomic concepts will be reinforced throughout the rotation by the student directly identifying anatomic structures with ultrasound. During this portion of the course, students will focus on the Extended Focused Assessment with Sonography for Trauma (e-FAST) exam, which is used to identify free fluid in abdomen, pericardial effusion, pleural effusion, and pneumothorax. Students will review didactics on the basic principles of ultrasound and e-FAST exam. Additionally, students will review relevant literature on the clinical utility and limitations of the e-FAST exam.

Once completing the didactic components, students will be oriented to the point of care ultrasound workflow in the emergency department and learn to scan under the guidance of twenty emergency medicine faculty who have hospital credentials for both lung and FAST ultrasound exams. Students will then practice performing the e-FAST independently on patient volunteers with associated confirmatory radiologic studies, such as chest and abdomen CT scans. Throughout the rotation, students will have dedicated 1:1 scanning sessions with faculty. While scanning in the ED, EM faculty present and/or working clinically will be available to students for any questions or assistance. Thus, students will have a component of faculty supervision at all times while in the ED. All ultrasounds performed by students will be reviewed and formative feedback will be provided. During dedicated sessions, students will review their images for quality assurance and direct feedback with emergency medicine faculty within the emergency ultrasound section. Additionally, students will be invited to sessions with ultrasound section faculty and residents reviewing various ultrasound pathology.

In performing the FAST exam, students will learn the sonographic appearance and relationship of key abdominal structures, and learn indications and limitations of the exam in the appropriate clinical context. To better observe this clinical context, students will be invited, but not required, to attend the evaluation of all patients with Level II trauma activations, and can perform the FAST exam on those patients as indicated.

For additional learning experience with focus on viewing pathological findings, students will perform the e-FAST exam on “SonoSim”, an ultrasound simulator owned by the Department of Emergency Medicine, housed at the University of Wisconsin Hospital Simulation Center. The “Sonosim” uses a mock probe and a mannequin that generates images cataloged from actual patient cases, with several examples of pathology including pneumothorax, pericardial effusion and free fluid in the abdomen.

Sample student schedule: approximately 90 hours over 2 weeks

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1 44 hours	Read Anatomy and point of care ultrasound chapters. (6 hours) Read Journal articles (3 hours)	Watch point of care ultrasound lectures (6 hours) Orientation and 1:1 scanning with faculty (3 hours)	e-FAST in ED (6 hours) Scanning on ultrasound simulator with faculty (2 hours)	e-FAST in ED (5 hours) Review of pathology and image quality assurance with faculty (4 hours)	e-FAST in ED (6 hours) Read journal articles (3 hours)
Week 2 46 hours	e-FAST in ED (7 hours) Read journal articles (3 hours)	1:1 scanning with faculty (3 hours) e-FAST in ED (6 hours)	e-FAST in ED (7 hours) Scanning on ultrasound simulator (2 hours)	e-FAST in ED (6 hours) Image quality assurance with faculty (3 hours)	e-FAST in ED (7 hours) Independent Testing with US faculty (2 hours)