COURSE OVERVIEW

In the US, injuries are the leading cause of death among persons ages 1–44 years of age, which results in more deaths than non-communicable diseases and infectious diseases combined. In this course, students will be exposed to the continuum of injury, repair, regeneration, and rehabilitation through the multidisciplinary viewpoints of emergency medicine, trauma surgery and associated surgical subspecialties, anesthesia, hematology & transfusion medicine, physical and occupational therapy, speech-language pathology, nutrition, palliative care, medical examiner, case management & social work, and physical medicine & rehabilitation.

The course is co-directed by trauma surgeon, surgical intensivist, and brain dysfunction researcher Mayur Patel, Assistant Professor of Surgery & Neurosurgery. Lillian Nanney, PH.D, Professor of Plastic Surgery, Cell & Developmental Biology and Medical Education & Administration serves as the other course co-director. She has a career long focus on wound repair and anatomy.

Foundational sciences that are highly integrated into the course are Anatomy, Epidemiology, Ethics, Immunology, Implementation Science, Neuroscience, Nutrition sciences, Pathology, Pathophysiology, Pharmacology, Social Sciences, Speech Sciences, and System Sciences. Students will spend portions of their clinical experience on the Trauma Service, supplemented by rehabilitation didactics and rotations at the Pi Beta Phi Rehabilitation Institute and Stallworth Hospital. Aspects of death will be reviewed at the Medical Examiner's Office. Didactics will focus on anatomy (cadaver-based and imaging), hemostasis and thrombosis, wound healing and regeneration of skin, bone, nutrition, speech-language pathology, and physiatry. Finally student will be exposed to learning across the continuum from acute to long-term recovery including the realities of surrogate decision-making, code status, palliative care, and death following trauma.

Students will experience three American College of Surgeons adult-learning courses, which focus on the care of the injured patient. Initially students will complete the Trauma Evaluation & Management (TEAM) course expressly designed for medical students. During the month, students will audit and fully participate in the Advanced Surgical Skills Exposure for Trauma Course (ASSET), alongside senior surgical residents and visiting residents and surgeons. The third course is the Advanced Trauma Life Support (ATLS) course, which students will be expected to be fully prepared through self-study and at least thoroughly audit. For the motivated, upon successful completion of the skills and medical knowledge ATLS exams, each student will be eligible for the four-year American College of Surgeons Advanced Trauma Life Support (ATLS) certification that will be awarded around Vanderbilt Medical School graduation. Both ATLS and ASSET courses as well as the anatomy dissecting practice session will utilize the Surgical and Anatomical Simulation facilities, a part of the Center for Experiential Learning and Assessment (CELA).
All basic science and clinical experiences in the course will provide ample opportunity for students to observe and participate in situations that are ripe for systems-based process and quality improvement. Each student is expected to pick one circumstance and provide an oral process/quality improvement presentation to the course directors and peers in the course. The end of course summative assessment (MCQ and essays) will occur on the final day.
Course Syllabus for Integrated Science Course: Injury, Repair and Rehabilitation
Course Offering: Section 9, 08/31/15 - 09/25/15

COURSE LEARNING OBJECTIVES & GOALS: Injury Phase

**Trauma Evaluation and Management (Trauma Fellow)**
1. Describe fundamental principles of initial assessment and management
2. Identify correct sequence of management priorities
3. Describe appropriate techniques of resuscitation
   - Recognize the value of a patient’s history
4. Understand importance of mechanism of injury
5. Identify concepts of teamwork in caring for an injured patient

**Advanced Trauma Life Support (Catherine S. Wilson, ATLS Faculty)**
1. Demonstrate concepts and principles of the primary and secondary patient assessments.
2. Establish management priorities in a trauma situation.
3. Initiate primary and secondary management necessary within the golden hour for the emergency management of acute life-threatening conditions.
4. In a given simulated clinical and surgical skills practicum, demonstrate structured skills, which are often required in the initial assessment and treatment of patients with multiple injuries.
   A) Primary and secondary assessment of a patient with simulated, multiple injuries
   B) Establishment of a patent airway and initiation of assisted ventilations.
   C) Orotracheal intubation on adult and infant manikins
   D) Pulseoximetry and carbon dioxide detection in exhaled gas
   E) Cricothyroidotomy
   F) Assessment and treatment of a patient in shock, particularly recognition of life-threatening hemorrhage
   G) Venous and intraosseous access
   H) Pleural decompression via needle thoracentesis and chest tube insertion
   I) Recognition of cardiac tamponade and appropriate treatment
   J) Clinical and radiographic identification of thoracic injuries
   K) Use of peritoneal lavage, ultrasound (FAST), and computed tomography (CT) in abdominal evaluation
   L) Evaluation and treatment of a patient with brain injury, including use of the Glasgow Coma Scale score and CT of the brain
   M) Assessment of head and facial trauma by physical examination
   N) Protection of the spinal cord, and radiographic and clinical evaluation of spine injuries
   O) Musculoskeletal trauma assessment and management
   P) Estimation of the size and depth of burn injury and volume resuscitation
   Q) Recognition of the special problems of injuries in infants, the elderly, and pregnant women
   R) Understanding of the principles of disaster management

**Anatomic Review and Preparation for Advanced Surgical Skills for Exposure in Trauma (Lillian Nanney, Catherine S. Wilson, Mayur Patel, ASSET Faculty)**
1. Identify anatomy and expose the axillary artery
2. Identify anatomy and expose the brachial artery and its bifurcation
3. Identify anatomy and expose the radial and ulnar arteries.
4. Identify anatomy and expose the forearm and hand compartments
5. Identify anatomy and expose the common, profunda, and superficial femoral arteries.
6. Identify anatomy and expose the popliteal artery above and below the knee.
7. Identify anatomy and expose the compartments of the lower leg
8. Identify anatomy and expose the compartments of the thigh
9. Identify anatomy and expose the compartments of the foot.
10. Identify anatomy and expose the proximal subclavian artery
11. Identify anatomy related to the zones of the neck
12. Identify anatomy and expose the sternocleidomastoid and omohyoid muscles, internal jugular vein, facial vein, and common carotid, internal, and external carotid arteries in zone 2 of the neck

13. Identify anatomy and expose the cricothyroid membrane, trachea, and esophagus in zone 2 of the neck
14. Explain the pathophysiology of cardiac tamponade and perform a median sternotomy
15. Summarize the indications for left lateral Emergency Department resuscitative thoracotomy
16. Identify anatomy and expose the chest wall, pericardium, heart, lung hilum, and major thoracic vessels
17. Using a clamshell thoracotomy, identify anatomy and expose the inferior pulmonary ligament, pulmonary vessels and hilum
18. Compare and contrast the various methods for control of hilar bleeding and understand pulmonary tricototomy
19. Identify anatomy and expose the subclavian arteries via resection of the clavicular head
20. Identify anatomy and expose the transabdominal retroperitoneum for performing pelvic packing
21. Identify anatomy and expose the retroperitoneal iliac vessels
22. Compare and contrast methods for identifying and exposing the supra-celiac aorta
23. Identify anatomy and expose the distal IVC and the retroperitoneal structures
24. Identify anatomy and expose the aorta and the iliacs below the root of the mesentery
25. Compare and contrast the management of liver bleeding
26. Identify anatomy and expose the ligaments of the liver and the retrohepatic inferior vena cava
COURSE SYLLABUS FOR INTEGRATED SCIENCE COURSE: Injury, Repair and Rehabilitation
Course Offering: Section 9, 08/31/15 - 09/25/15

COURSE LEARNING OBJECTIVES & GOALS: Repair Phase

Hemostasis and Thrombosis (Quentin Eichbaum)

Acute Wound Repair (Lilian Nanney)
1. Overview the functions of skin and explain how cutaneous injury can be disruptive to these histologic and molecular features.
2. Explain the expected timeline, histologic features and processes of normal excisional repair such as inflammation, new tissue (granulation tissue) formation (fibroblastic migration, proliferation, neovascularization) and re-epithelialization.
3. Compare and contrast the remodeling phase (with its fibrosis, contraction, scar formation) with the regenerative events of fetal wound repair and the potential for skin regeneration

Bone Healing (Jonathan Schoenecker)
1. Describe the principal cells in bone biology and their origin
2. Describe the two ways in which bone is formed.
3. Name the zones and principal function of the physis.
4. Describe the cellular mechanisms of fracture repair.
5. Describe fracture patterns observed on x-rays

Early Responses to Burn Injury (J. Blair Summit)
1. Use a burn injury classification scheme to define the clinical and histological features of burn assessment.
2. Predict prognosis and chart burn injury based on standard tools (e.g., Lund & Browder chart)
3. Describe the rationale for fluid replacement therapy and recognize the sequelae when it is not managed properly (over or under resuscitated).
4. Discuss the steps of an excision and autografting procedure. Explain timing, expectations for blood loss, infection risk and preventative measures, dressings, pain management
5. Recognize special circumstances: child abuse (scalds), methamphetamine explosions with toxic inhalation, electrical burns
6. Write orders for daily treatment of small burn wounds (<20% TBSA)

Assisted Wound Healing and Long Term Outcomes (J. Blair Summit)
1. Discuss the range of options for achieving wound closure in patients with large burn wounds (20% TBSA). Explain the concept of the reconstructive ladder in providing skin coverage.
2. Describe 2 types of skin substitutes/biologic dressings and how these therapeutic options make use of the normal processes of wound repair
3. Explain how the burn center team approaches the challenges of repair (infection, hydrotherapy, metabolic and rehabilitative needs for patients with large burns.
4. Recognize the problems (aesthetic, psychological, functional) that are associated with hypertrophic scarring.

Chronic Skin Wounds (Marcia Spear & Lillian Nanney)
1. Define the clinical hallmarks and histologic criteria for the 6 stages of pressure ulcers
2. Compare and contrast the features of venous stasis, pressure ulcers, diabetic foot ulcers, arterial ulcers
3. Sketch the epidemiology for the 4 types of chronic skin ulcers and its economic impact.
4. Explain how normal wound healing processes are altered in the chronic ulcer setting.
5. Visually distinguish between ulcerative types and explain 4 therapeutic approaches to their management.

Metabolic response to stress and starvation (Douglas Seidner) (http://nutritioninmedicine.org/portal/)

Nutrition Assessment & Requirements (Jill Murphree)
1. Describe laboratory and clinical parameters used to assess nutritional status
2. Determine energy and protein requirements for an adult patient

Parenteral Nutrition Overview (Jill Murphree)
1. Recognize appropriate patient candidates to receive parenteral nutrition
2. List the protein, carbohydrate, lipid, and micronutrient components of an appropriate parenteral nutrition regimen
3. Understand potential complications of parenteral nutrition

Enteral Feeding Basics (Beth Mills)
1. Communicate the differences and similarities among the different methods of feeding (oral intake, supplementation, enteral feedings, parenteral nutrition [TPN])
2. Understand the core aspects of enteral feeding and the role of nutrients, formulas, catheters, safety basics, and administration

Home Tube Feeding (Ellen Ladage)
1. Review the Medicare guidelines regarding Enteral Nutrition
2. Describe the mechanical, cutaneous, and gastrointestinal challenges associated with home tube feeding administration
**Course Syllabus for Integrated Science Course:** Injury, Repair and Rehabilitation  
**Course Offering:** Section 9, 08/31/15 - 09/25/15

**COURSE LEARNING OBJECTIVES & GOALS:** Rehabilitation or End of Life Phase

**Voice (Barb Jacobson)**  
1. Understand anatomy and physiology of voice production

**Alterations in speech and airway post-Trauma (Carmin Bartow)**  
1. Understand the role of airway management in speech and swallowing
2. Explain the anatomy and physiology behind Passy-Muir Valves for tracheostomies

**Swallowing (Laura McBride)**  
1. Review the anatomy and physiology for deglutition and phonation
2. Experience and understand a formal video swallow assessment

**Aphasia and Neuroanatomy of Language (Michael de Riesthal)**  
1. Define aphasia.
2. Describe the Hickok model for the functional neuroanatomy of language
3. Describe the relationship between aphasia type and lesion localization.
4. Experience communication challenges between families and patients with aphasia

**Aphasia Communication (Dominique Herrington)**  
1. Participate in speech-language pathologist supported social interaction and communication exchanges with survivors of traumatic brain injury, stroke, and brain tumors

**Speech Mechanism and Neurogenic Speech Impairments (Antje Mefferd)**  
1. Describe the neurological basis of speech motor control and execution
2. Describe the current Mayo classification system of motor speech disorders
3. Explain challenges for the accurate and timely diagnosis of progressive dysarthrias

**Physical Therapy (Chrissy Durrough)**  
1. Demonstrate understanding of the physical therapy profession and its role in rehabilitation
2. Demonstrate a basic understanding of movement patterns for gait and transfers and recognize deviations from “normal.”
3. Demonstrate understanding of fall risk factors and when referral to physical therapy may be indicated.
4. Demonstrate a basic understanding of our balance systems and the functional implications for impairments in the visual, vestibular, and/or somatosensory systems.

**Occupational Therapy (Valery Hanks)**  
1. Demonstrate understanding of Occupational Therapy and its role in rehabilitation
2. Demonstrate improved knowledge of adaptive equipment and techniques used to assist persons with disabilities with activities of daily living
3. Demonstrate increased understanding of visual impairments and how these impairments can disrupt performance of daily activities

**Rehabilitation of Multiple Trauma, Disposition Decision-making, and Falls & Safety (Natasa Miljkovic)**  
1. Compare and contrast the Rehabilitation of musculoskeletal trauma, spinal cord injury, and traumatic brain injury
2. Describe the facility level and patient level characteristics for Inpatient Rehabilitation, Skilled Nursing Facilities, and Assisted Living Facilities
3. Apply disposition criteria in determining which patients are safe for discharge to home and what home health services will be required
4. Understand the classification, epidemiology, risk factors, and preventive strategies for falls
5. Communicate multidisciplinary safety strategies and interventions to fellow providers, patients, and/or families
6. Complete history & physical focused on Rehabilitation

Coroner’s Evaluation (Tom Deering)
1. Accurate categorization of cause, manner, and mechanism of death
2. Injury patterns in blunt, sharp, and ballistic trauma
3. The role of the forensic autopsy, and how it differs from the hospital autopsy
4. Postmortem changes, including livor and rigor mortis, and the interpretation of postmortem laboratory studies
5. Gross pathology of natural disease

Palliative Care: Code Status and Surrogates (Matthew R. Peachey)
1. Discuss expected outcomes of resuscitation for common chronically ill patient conditions
2. Identify appropriate surrogates in situations both with documentation of medical decision makers and without such documents

Palliative Care: Approach to Advance Care Planning (Maie El-Sourady)
1. Define Advance Care Planning
2. Review a practical approach to advance care planning
3. Discuss barriers and challenges with Advance Care Planning
4. Discuss which documentation is most helpful at different stages of Advance Care Planning
Course Syllabus for Integrated Science Course: Injury, Repair and Rehabilitation
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COURSE LOGISTICS

Scheduling and Course Materials
- Your Vanderbilt Outlook calendar will reflect the most accurate course schedule [subject (speaker), times, and locations)].
- Box will reflect the course materials
- VSTAR/Learn may have the above components available in duplicate
  a) Link to Box for associated learning materials (powerpoints, assignments)
  b) VSTAR/Learn calendar and duplicate learning materials (powerpoints, assignments)
  c) Course Syllabus containing Standard Assessment Expectations for Integrated Science Courses and Milestones that will be assessed in this course
  d) Course Director Announcements
  e) Student Forum for questions and announcements from students. Students are encouraged to post questions to course directors at this site so all students can benefit from the answers. But e-mails are appropriate for personal matters.
  f) You may expect to find milestone-based assessments on VSTAR/Portfolio.

Locations for Learning Activities
Conference Rooms:
- Medical Arts Building, 338 and 404 conference rooms
- Vanderbilt University Hospital (VUH)
- 10 North (10N) Trauma conference room
- Oxford House, 7th Floor Conference Room
- Assorted Light Hall rooms
Surgical & Anatomic Simulation Facility
- Medical Center North (MCN), Rooms 1311 or 1315B
Trauma ICU and Trauma Stepdown
- Vanderbilt University Hospital (VUH), 10 North
Trauma NP Work Area
- Top of Vanderbilt University Hospital (VUH), Lifeflight Offices
Stallworth Rehabilitation Hospital
- 2201 Children's Way
Pi Beta Phi Rehabilitation
- Medical Center East (MCE), South Tower, 9th Floor
Nashville Medical Examiner's Office
- 850 R.S. Gass Blvd, Nashville, TN 37216
**Course Syllabus for Integrated Science Course:** Injury, Repair and Rehabilitation  
**Course Offering:** Section 9, 08/31/15 - 09/25/15

### Course Faculty Names and E-mails

#### ISC: Injury, Repair, Rehabilitation Course Directors
- **Lillian Nanney, PhD**  
 lillian.nanney@Vanderbilt.Edu  
- **Mayur Patel, MD, MPH**  
 mayur.b.patel@Vanderbilt.Edu

#### Repair Faculty
- **J. Blair Summitt, MD**  
 blair.summitt@Vanderbilt.Edu  
- **Jonathan Schoenecker, MD, PhD**  
 jon.schoenecker@Vanderbilt.Edu  
- **Lillian Nanney, PhD**  
 lillian.nanney@Vanderbilt.Edu  
- **Quentin Eichbaum, MD, PhD, MPH, MFA, MMHC, FCAP**  
 quentin.eichbaum@Vanderbilt.Edu

#### Nutrition Team
- **Beth Mills, MS, RD, CNSD, LDN**  
 beth.mills@Vanderbilt.Edu  
- **Douglas Seidner, MD, FACG, CNSP**  
 douglas.seidner@Vanderbilt.Edu  
- **Ellen Ladage, RD, CNSC, LDN**  
 ellen.ladage@Vanderbilt.Edu  
- **Jill Murphree, MS, RD, CNSC**  
 jill.n.murphree@vanderbilt.edu

#### End of Life Team
- **Feng Li, MD**  
 fli@forensicmed.com  
- **Maie El-Sourady, MD, MS**  
 maie.el-sourady@Vanderbilt.Edu  
- **Matthew R. Peachey, MD**  
 matthew.peachey@Vanderbilt.Edu  
- **Tom Deering, MD**  
 tdeering@forensicmed.com

#### Rehabilitation Faculty
- **Antje Mefferd, PhD, CCC-SLP**  
 antje.mefferd@vanderbilt.edu  
- **Barb Jacobson, PhD, CCC-SLP**  
 barb.jacobson@Vanderbilt.Edu  
- **Carmin Bartow, MS, CCC-SLP, BC-S**  
 carmin.bartow@Vanderbilt.Edu  
- **Chriissy Durrough, PT, DPT, NCS**  
 christina.m.durrough@Vanderbilt.Edu  
- **Dominique Herrington, MS, CCC-SLP**  
 dominique.herrington@Vanderbilt.Edu  
- **Laura McBride, MEd, CCC-SLP**  
 laura.mcbride@Vanderbilt.Edu  
- **Michael de Riethal, PhD, CCC-SLP**  
 michael.r.de.riesthal@Vanderbilt.Edu  
- **Natasa Miljkovic, MD**  
 natasa.miljkovic@Vanderbilt.Edu  
- **Valery Hanks, OTR/L, CPAM**  
 valery.hanks@vanderbilt.edu

#### Trauma Education and Process/Quality Improvement
- **Catherine S. Wilson, RN**  
 catherine.s.wilson@Vanderbilt.Edu  
- **Melissa Smith, RN**  
 melissa.d.smith@Vanderbilt.Edu

#### Trauma Faculty
- **Addison K. May, MD**  
 addison.may@Vanderbilt.Edu  
- **Aileen Ebadat, MD**  
 aileen.ebadat@vanderbilt.edu  
- **Andrew Hopper, MD**  
 herbert.a.hopper@vanderbilt.edu  
- **Bradley Dennis, MD**  
 bradley.m.dennis@Vanderbilt.Edu  
- **Jason Young, MD, PharmD**  
 jason.b.young@vanderbilt.edu  
- **Julie Son, MD**  
 julie.valenzuela@vanderbilt.edu  
- **Lisa Rae, MD**  
 lisa.rae@vanderbilt.edu  
- **Mayur Patel, MD, MPH**  
 mayur.b.patel@Vanderbilt.Edu  
- **Michael Krzyzaniak, MD**  
 michael.j.krzyzaniak@vanderbilt.edu  
- **Oliver Gunter, MD, MPH**  
 oliver.l.gunter@Vanderbilt.Edu  
- **Oscar Guillamondegui, MD, MPH**  
 oscar.guillamondegui@Vanderbilt.Edu  
- **Raeanna Adams, MD**  
 raeanna.c.adams@Vanderbilt.Edu
Course Syllabus for Integrated Science Course: Injury, Repair and Rehabilitation
Course Offering: Section 9, 08/31/15 - 09/25/15

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
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<tbody>
<tr>
<td>Richard Lesperance, MD</td>
<td><a href="mailto:richard.n.lesperance@vanderbilt.edu">richard.n.lesperance@vanderbilt.edu</a></td>
</tr>
<tr>
<td>Richard Miller, MD</td>
<td><a href="mailto:richard.miller@Vanderbilt.Edu">richard.miller@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Shannon Eastham, MD</td>
<td><a href="mailto:shannon.c.eastham@Vanderbilt.Edu">shannon.c.eastham@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Stephen Gondek, MD, MPH</td>
<td><a href="mailto:stephen.p.gondek@vanderbilt.edu">stephen.p.gondek@vanderbilt.edu</a></td>
</tr>
<tr>
<td>Timothy Johnson, MD</td>
<td><a href="mailto:timothy.g.johnson@vanderbilt.edu">timothy.g.johnson@vanderbilt.edu</a></td>
</tr>
<tr>
<td>Timothy Nunez, MD</td>
<td><a href="mailto:timothy.c.nunez@Vanderbilt.Edu">timothy.c.nunez@Vanderbilt.Edu</a></td>
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**Trauma Advanced Practitioners**

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bethany Evans, RN, MSN, ACNP-BC</td>
<td><a href="mailto:bethany.evans@Vanderbilt.Edu">bethany.evans@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Carolyynn Nall, MSN,RN, APRN,BC</td>
<td>caroly <a href="mailto:nn.k.nall@vanderbilt.edu">nn.k.nall@vanderbilt.edu</a></td>
</tr>
<tr>
<td>Diana Williams, MSN,RN, APRN,BC</td>
<td><a href="mailto:diana.d.williams@Vanderbilt.Edu">diana.d.williams@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Jacki Ford, MSN,RN, APRN,BC</td>
<td><a href="mailto:jaquelyn.m.ford@vanderbilt.edu">jaquelyn.m.ford@vanderbilt.edu</a></td>
</tr>
<tr>
<td>Janelle Delle, MSN, ACNP-BC</td>
<td><a href="mailto:janelle.delle@Vanderbilt.Edu">janelle.delle@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Kathleen Donais, MSN,RN, APRN,BC</td>
<td><a href="mailto:kathleen.donais@Vanderbilt.Edu">kathleen.donais@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Linda Wilkinson, MSN,RN, APRN,BC</td>
<td><a href="mailto:linda.wilkinson@Vanderbilt.Edu">linda.wilkinson@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Mary Marshall, MSN,RN, APRN,BC</td>
<td><a href="mailto:mary.marshall@Vanderbilt.Edu">mary.marshall@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Meilissa (Mort) Morton, MSN,RN, APRN,BC</td>
<td><a href="mailto:melissa.m.morton@Vanderbilt.Edu">melissa.m.morton@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Nicola Hempel, , MSN,RN, APRN,BC</td>
<td><a href="mailto:nicola.hempel@Vanderbilt.Edu">nicola.hempel@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Nina Collins, MSN, RN, APRN, BC</td>
<td><a href="mailto:nina.e.collins@Vanderbilt.Edu">nina.e.collins@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Rachel Wise, MSN, RN, APRN,BC</td>
<td><a href="mailto:rachel.d.wise@Vanderbilt.Edu">rachel.d.wise@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Rita (Manry) Martin, MSN,RN, APRN,BC</td>
<td><a href="mailto:manry.porter@Vanderbilt.Edu">manry.porter@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Shelley Atkinson, MSN, RN, APRN, BC</td>
<td><a href="mailto:shelley.r.atkinson@Vanderbilt.Edu">shelley.r.atkinson@Vanderbilt.Edu</a></td>
</tr>
<tr>
<td>Shelley Robert, MSN,RN, APRN,BC</td>
<td><a href="mailto:shelley.robert@vanderbilt.edu">shelley.robert@vanderbilt.edu</a></td>
</tr>
<tr>
<td>Susan Jeansonne, MCN, ACNP-BC</td>
<td><a href="mailto:susan.b.jeansonne@vanderbilt.edu">susan.b.jeansonne@vanderbilt.edu</a></td>
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Course Syllabus for Integrated Science Course: Injury, Repair and Rehabilitation
Course Offering: Section 9, 08/31/15 - 09/25/15

Course Requirements and Modes of Assessment:
All ISCs will use qualitative (VUSM competency milestones) and quantitative measures (quizzes, examinations, presentations, reflections) when determining final grades (Honors, High Pass, Pass or Fail). To pass an ISC Course, each student must pass both the **quantitative and qualitative measures.** To obtain honors, a student should demonstrate excellent performance in *all* aspects of the course. Mid-course feedback will be provided as follows: Green light, Yellow light, Red light. It will be based on 2 weeks of quizzes, mid-course quality of engagement in activities (labs, classroom discussions). At the end of the course, Course directors will synthesize milestone input from faculty, residents, staff) and make one final assessment for each competency, which will be considered when determining a final grade.

Milestone assessments will accumulate individually into the portfolio from these activities. The course directors will make an overall milestone assessment based on the accumulation of datapoints and behaviors throughout the course. All ISCs will assign final grades based on the following criteria:

<table>
<thead>
<tr>
<th>Final Grade</th>
<th>Quantitative Score</th>
<th>Summative Competency Ratings (Qualitative Score) (6 domains assessed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of Failure</td>
<td>&lt;70%</td>
<td>Any Sub-Threshold OR &gt;2 Thresholds</td>
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<tr>
<td>(course director discretion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pass</td>
<td>At least 70%</td>
<td>No more than 2 Thresholds All others at Target or above</td>
</tr>
<tr>
<td>High Pass</td>
<td>At least 80%</td>
<td>At least 3 Reaches All others at Target</td>
</tr>
<tr>
<td>Honors</td>
<td>At least 90%</td>
<td>Nothing below Target 5 Reaches</td>
</tr>
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</table>

**Student grievance concerning grades**
Students can seek redress of a problem with a grade no later than four weeks after the grade is released. Students with a grievance should confer directly with the ISC Director. Every effort should be made to resolve the problem fairly and promptly at this level. If the student and ISC Director cannot resolve the problem through discussion, the student can formally request an appeal, within two weeks of talking with the course director, from the Associate Dean for Medical Student Affairs (ADMSA). Appeal will prompt a review of the course’s assessment practices by the Standing Assessment Committee, as well as a review of the individual student’s situation by the ADMSA, the Associate Dean for Undergraduate Medical Education, and a neutral faculty reviewer. If resolution is still not achieved, the ADMSA will make a recommendation to the Senior Associate Dean for Health Sciences Education, who will make the final decision.
Course Syllabus for Integrated Science Course: Injury, Repair and Rehabilitation
Course Offering: Section 9, 08/31/15 - 09/25/15

Quantitative assessments in Injury, Repair and Rehabilitation will be determined as follows:

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Didactic Group Participation</td>
<td>5%</td>
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<tr>
<td>Clinical Service Evaluations</td>
<td>20%</td>
</tr>
<tr>
<td>Quality Improvement Presentation</td>
<td>10%</td>
</tr>
<tr>
<td>Test: Repair (Hemostasis, Nutrition, Bone, Skin)</td>
<td>10%</td>
</tr>
<tr>
<td>Test: Anatomy (ASSET)</td>
<td>10%</td>
</tr>
<tr>
<td>Test: Injury (ATLS)</td>
<td>25%</td>
</tr>
<tr>
<td>Test: Rehabilitation &amp; Final</td>
<td>20%</td>
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</tbody>
</table>

These competency domains and milestones (qualitative aspects) are required for student assessment in all ISC Courses: [https://medschool.vanderbilt.edu/ume/isc-milestones](https://medschool.vanderbilt.edu/ume/isc-milestones).
Course Syllabus for Integrated Science Course: Injury, Repair and Rehabilitation
Course Offering: Section 9, 08/31/15 - 09/25/15

Key Learning Resources:
TEAM CD, ATLS Course Book, ASSET CD

Content Areas Covered within Injury, Repair & Rehabilitation

**Disciplinary Threads:** (check all that applies)

| X Anatom- Gross | ☐ Genetics |
| ☐ Anatom-Microscopic | ☐ Healthcare Policy & Economics |
| ☐ Biostatistics | ☐ Human Development |
| ☐ Biochemistry | x Infection, Immunology and Inflammation |
| ☐ Biomechanics | x Leadership |
| ☐ Biomedical Informatics | x Learning & Teaching |
| ☐ Cell & Developmental Biology | ☐ Microbiology |
| x Communication | x Nutrition |
| ☐ Cultural Competence | x Pathology |
| ☐ Embryology | x Pathophysiology |
| x Epidemiology/Clinical Epidemiology | x Pharmacology |
| x EBM + Clinical Care-Diagnosis | ☐ Physiology |
| x Diagnostic Imaging | x Professional Formation |
| x Laboratory Diagnosis | ☐ Research & Scholarship |
| x Physical Diagnosis | x Safety and Quality Improvement |
| ☐ EBM + Clinical Care-Therapeutics | x Social sciences (Psych, Soc, Anthro) |
| ☐ Behavioral | x Systems of Care |
| x Pharmacologic | ☐ Toxicology |
| x Procedural skills (diag/thera) | ☐ Physics |

**Interdisciplinary Threads:** (check all that applies)

| ☐ Asthma | x Healthcare Disparities |
| ☐ Cancer | ☐ Heart Disease |
| x Chronic Illness | ☐ HIV/AIDS |
| x Critical Thinking, Reasoning | ☐ Obesity |
| ☐ Developmental Disabilities | ☐ Pain |
| ☐ Diabetes | x Palliative Care |
| ☐ Gender-Based Medicine | ☐ Sexuality |
| ☐ Global Health | x Trauma |
| x Interprofessional Skills | x Wellness & Prevention |

Other: Physiatry and Rehabilitation, Speech & Hearing Sciences