ANESTHESIA (ANES)

ANES 199. Undergraduate Research. 1-18 Unit.
Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

ANES 202. Anesthesiology and Pathophysiologic Implications for the Perioperative Patient. 1 Unit.
Provides participants a case-based review of organ physiology and an in-depth discussion of the pathophysiologic mechanisms during the perioperative period that affect outcome in surgical patients. All major organ systems will be discussed, and subjects such as airway management, ventilatory support, transfusion practices, pharmacology and the acute management of shock will be covered. This course provides useful information for all students involved or interested in acute care of the critically ill patient. Lecturers are Stanford anesthesia faculty and visiting guest faculty. Prerequisite: completion of first year curriculum is strongly encouraged.

With ever-growing innovation in healthcare, how do investors evaluate and fund new ventures in one of the most diverse, operationally complex and regulated industries? Health care investment is unique in its dynamic evolution across decades of scientific, business and regulatory development. How might patients, providers, technologists, and investors, which we define as our Stanford Medicine X Everyone Included team model, help identify the best opportunities for the health care investor? This course focuses on how health care investors think and make strategic decisions, incorporating both changing financial metrics and qualitative investment theses. This colloquium will feature guest speakers including senior investment professionals, visionary business leaders and passionate new voices such as patient experts that have traditionally been absent from investment decisions. Students enrolling for 2 units prepare a final paper.

ANES 205. Engage and Empower Me: Myths and Truths of Designing for Patient Behavior. 2-3 Units.
Focus is on patient stories and real-life experiences of patient engagement, the neuroscience of behavior change and the principles of patient engagement. Together with patients, students participate in design sessions at Stanford’s simulation center to create and test ways to modify behavior through design. Topics include the neuroscience behind motivating individuals into healthy behaviors, including patients in the care design process, how health educators, designers, techies and investors can improve success. Students enrolling for 3 units complete a class project.

ANES 206. 3D Printing and Biofabrication. 1-2 Unit.
Focus is on medical possibilities of 3D printing. Additive manufacturing, often termed 3D printing, uses automated techniques to produce physical objects using layer-by-layer construction methods. Biofabrication applies these same techniques to print physical objects from biological cells. Such techniques hold great promise to transform health and medicine to deliver more personalized care solutions for patients. This colloquium course explores the future of 3D printing and its impact on health and medicine. See http://medicine stanford edu/anesthesia206/. Students enrolling for 2 units prepare a final paper.

ANES 207. Medical Acupuncture. 2 Units.
Acupuncture is part of a comprehensive system of traditional Chinese Medicine developed over the past two millennia. This course reviews the history and theoretical basis of acupuncture for the treatment of various diseases as well as for the alleviation of pain. Issues related to the incorporation of acupuncture into the current health care system and the efficacy of acupuncture in treating various diseases are addressed. Includes practical, hands-on sections.

ANES 208A. Data Science for Digital Health and Precision Medicine. 1-2 Unit.
How will digital health, low-cost patient-generated and genomic data enable precision medicine to transform health care? This Everyone Included course from Stanford Medicine X and SHC Clinical Inference will provide an overview of data science principles and showcase real world solutions being created to advance precision medicine through implementation of digital health tools, machine learning and artificial intelligence approaches. This class will feature thought leaders and luminaries who are patients, technologists, providers, researchers and leading innovators from academia and industry. This course is open to undergraduate and graduate students. Lunch will be provided.

ANES 211SI. Themes in the History of Science and Medicine. 1 Unit.
What exactly is a diagnosis, and what is the history of that term? Why do Institutional Review Boards exist, and what atrocities in human medical experimentation occurred to prompt their creation? What is the role of narrative, social construction, and storytelling in medicine? This course will shed light on the ways physicians and scholars grapple with these and other important questions through a series of lectures from historians and philosophers of science, as well as bioethicists and scholars of narrative medicine. These perspectives on how scientific knowledge emerges and changes over time offer invaluable insights and frameworks for anyone aspiring to practice medicine or contribute to the collective body of scientific knowledge.

Review of current literature in both basic and clinical neuroscience in a seminar format consisting of both faculty and student presentations.

ANES 280. Early Clinical Experience in Anesthesiology. 1-2 Unit.
Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

ANES 299. Directed Reading in Anesthesiology. 1-18 Unit.
Prerequisite: consent of instructor.

ANES 300A. Anesthesia Operating Room Clerkship. 3-6 Units.
Open to visitors. This clerkship provides an introduction to the perioperative anesthetic management of the surgical patient. In this clinical setting, and under close faculty and resident supervision, students have an opportunity to learn and apply the principles of preoperative evaluation of patients, intraoperative monitoring techniques, assessment of vital organ status, pharmacology of anesthetic and related drugs, and immediate postoperative management. In addition, students have ample opportunity to learn and practice a variety of technical skills, including airway management and intravenous cannulation, which will be of value in any clinical specialty. Students are assigned to the operating room at the SUMC. Didactic lectures, clinical conferences, as well as anesthesia simulator course, will be offered throughout the rotation. Students will work closely with pre-assigned faculty and residents during the two-week clerkship. Please note: Visiting students must obtain approval from Ms. Mun Tao prior to applying for this clerkship. Please email requests to yuntao@stanford.edu. Prereq: A major clerkship in medicine or surgery is strongly recommended. Periods Avail: 38-12, full-time for two weeks. 4 students per two week period. Reporting Instructions: Where: Anesthesia Grand Rounds at Li Ka Shing Center; Time: 6:45 am. Units: 3-6. Call Code: 0 Director: Marianne Chen, M.D. (650-723-7377). Other Faculty: Stanford Department of Anesthesiology Faculty. Coord: Yun Tao (650-724-1706), H-3580, Stanford Hospital. (SUMC).
ANES 300B. Anesthesia Operating Room Clerkship. 3 Units.
Open to visitors. Exposes students to the administration of anesthetics to surgical patients in the operating room. In this clinical setting, at the PAVAMC and under close faculty and resident supervision, students have an opportunity to learn and apply the principles of preoperative evaluation of patients, intraoperative monitoring techniques, assessment of cardiovascular and respiratory status, and the pharmacology of anesthetic and related drugs. In addition, students have ample opportunity to learn and practice a variety of technical skills, including airway management, endotracheal intubation, and intravenous and intra-arterial cannulation which would be of value in any clinical specialty. Please note: Visiting students must obtain approval from Ms. Yun Tao prior to applying for this clerkship. Please email requests to yuntao@stanford.edu. Prereq: A major clerkship in medicine or surgery is strongly recommended. Periods Avail: 3B-12, full-time for two weeks. 2 students per period. Reporting Instructions: Where: PAVAHCS, Building 101, Room A3-205, 3rd Floor; Time: 8:30 am. Units: 3 DropCode: Call Code: 0. Director: Natasha Funck, M.D. (650-493-5000 ext 64216). Other Faculty: VAPAMC Anesthesia Faculty. Coord: Yun Tao (650-724-1706), H-3583, Stanford Hospital. (VAPAHCS).

ANES 300C. Anesthesia Operating Room Clerkship. 3-6 Units.
Open to visitors. This clerkship is an introductory course to anesthesiology at the Santa Clara Valley Medical Center. Clerkship students will be active participants during anesthetics cases and perform airway managements, intravenous cannulations, and administration of anesthetic agents. Students should expect considerable experiences with vascular cannulation during the first week of this clerkship. The second week will focus on airway management and administration of anesthesia. Please note: This clerkship accepts students from other medical institutions. In order to avoid overbooking, students who wish to do this clerkship MUST get pre-approval from clerkship director Dr. Lin before registering. Please email requests to yuntao@stanford.edu. Prereq: A major clerkship in medicine or surgery is strongly recommended. Periods Avail: 3B-12, full-time for two weeks. 1 student per period. Reporting Instructions: Where: SCVMC Department of Anesthesia Room 2M106, Kit Hardin (408) 885-3109; Time: 8:00 am. Please email a short statement explaining what you would like to get out of the rotation and what is your interest in Anesthesia to the Director prior to starting rotation. Units: 3 DropCode: Call Code: 0. Director: Mark Lin, M.D. (408-885-2604), mark.lin@hs.sccgov.org. Other Faculty: SCVMC Anesthesia Faculty. Coord: Yun Tao (650-724-1706), H-3580, Stanford Hospital. (SCVMC).

ANES 300D. Anesthesia Operating Room Clerkship. 6 Units.
Closed to visitors. Four weeks are spent learning theoretical and practical anesthetic fundamentals under the supervision of the anesthesiology staff at the Kaiser Permanente Medical Center, Santa Clara. The student will rotate with several anesthesiologists and thus receive a diverse exposure to anesthetic techniques and plans. Teaching during this rotation is intensive, didactic, and most importantly individualized; resulting in a rotation of value both to those considering anesthesiology as a future subspecialty and those who are not. Students on this clerkship are expected to prepare and deliver a presentation at one of the Departmental Noon Conferences, to prepare on a daily basis a topic for informal discussion with the attending anesthesiologist, and to attend all educational conferences offered by the Stanford University Hospital Anesthesiology Department. Basic textbook and supporting materials will be loaned to the student. An exit interview from the clerkship will be conducted to mutually exchange feedback regarding the rotation. Prereq: A major clerkship in medicine or surgery is required. Periods Avail: 1-12, full-time for four weeks (two week and three week rotations are permitted with prior approval). 1 student per period. Reporting Instructions: Where: KPMC, 710 Lawrence Expressway, Dept 384, Santa Clara, CA 95051 (408-851-3836). Report to Susan Krause; Time: 8:00 am. Units: 6 DropCode: Call Code: 0. Director: Jonathan Chow, M.D. (408-820-0607 pager). Other Faculty: Kaiser Santa Clara Anesthesiologist. Coord: Yun Tao (650-724-1706), H-3583, Stanford Hospital. (KPMC).

ANES 300P. Pediatric Anesthesia Clerkship. 3 Units.
Open to visitors. An introduction to the perioperative and intraoperative anesthetic management of the pediatric patient in a clinical setting. Under close supervision by faculty, fellows and residents, students learn and apply the principles of preoperative evaluation of pediatric patients, intraoperative monitoring techniques, assessment of vital organ status, pharmacology of anesthetic and related drugs, and immediate postoperative management. In addition, students will be exposed to many anesthetic procedures including arterial and central venous line placement, regional anesthesia and airway management. Opportunities to observe in the pediatric cardiac anesthesia venue and pediatric acute/chronic pain service are available if requested. Students are assigned to the operating room at LPCH and are notified by the clerkship director of the actual daily assignment the night before. Students will work closely with assigned faculty/fellows/residents during this two week clerkship. With the advanced approval of the director and depending on availability, the clerkship may be planned for 4 weeks. Please note: students who wish to do this clerkship MUST get pre-approval from clerkship director Dr. Olga Wolke before registering. Please email requests to yuntao@stanford.edu. Prereq: Anesthesia 300A. Reporting instructions: Students should attend anesthesia grand rounds if their first day is a Monday. Grand rounds are held in the Li Kai Shing center auditorium starting at 6:45 am almost every Monday. Students should get in touch with the clerkship site director, Dr. Olga Wolke, by email (oalbert@stanford.edu) before they start to get specific instructions and assignments, as well as reading material and for exceptions to the Monday morning Grand Rounds. (LPCH).

ANES 301A. Intensive Care Unit Clerkship. 6 Units.
Open to visitors. Designed to give medical students an in-depth exposure to critical care medicine. It offers students an opportunity to apply physiologic and pharmacologic principles utilizing sophisticated monitoring techniques to the care of critically ill patients. Students are closely supervised in total patient care and gain experience in a variety of technical skills. Although pulmonary, hemodynamic, and renal aspects of care are stressed, experience in all phases of surgical and medical patient care are provided. Students wishing to do this clerkship must get approval from Bernadette Carvalho first before registering. Prereq: Anesthesia 306A or Medicine and Surgery core clerkships. Periods Avail: 1-12, full-time for four weeks. 1 student per period. Reporting Instructions: Where: E2 300P (Medical-Surgical ICU at Stanford); Time: 8:00 am. Units: 6. Call Code: 4. Director: Erin Hennessey, M.D Other Faculty: T. Angelotti, R. Asklakson, G. Dhillon, J. Levitt, J. Lorenzo, F. Mihm, T. Mitarai, P. Mohabir, R. Pearl, N. Rizk, A. Rogers, S. Ruoss, A. Weinacker, J. Wilson. Coord: Bernadette F. Carvalho (berniec@stanford.edu). (SUMC).

ANES 302A. Obstetrical Anesthesia Clerkship. 3 Units.
Open to visitors. Covers the following areas: a theoretical understanding of the physiology of normal pregnancy; pain mechanisms in labor; methods of analgesia and anesthesia with advantages and complications in normal and abnormal labor and pregnancy; and regional and general anesthesia as applied in obstetrics. Practical experience is provided in anesthetic techniques for the obstetrical patient, as permitted by patient load; the experience of the residents on the rotations and the complexity of the cases. Please note: Visiting students must obtain approval from Yun Tao prior to applying for this clerkship. Please email requests to yuntao@stanford.edu. Prereq: Six months of clinical clerkships, preferably including Anesthesia 300A, 300B, 300C, or 300D. Periods Avail: 1-12, full-time for two weeks. 1 student per period. Reporting Instructions: Where: Delivery Room (must be arranged in advance with Dr. Abir); Time: 7:00 am. Units: 3. Call Code: 0 Director: Gillian Abir, M.D. Other Faculty: Obstetric Anesthesia Faculty. Coord: Yun Tao (650-724-1706), H-3583, Stanford Hospital. (LPCH).
ANES 304A. Chronic Pain Management Clerkship. 3-6 Units. 
Selective 1. Open to visitors. Relates the anatomy, physiology, biochemistry and psychosocial components of pain to the understanding and care of patients with acute, chronic, or cancer pain. Students are involved with faculty on a one-to-one basis while interviewing, examining, and treating patients in the multidisciplinary outpatient Pain Management Clinic from 8am to 5pm. Several times a week there are multidisciplinary conferences at lunch evaluating complex patients and neuromodulation cases. This conference includes anesthesiologists, psychologists, physical therapists, nurses, referring physicians and other interested medical specialists. Treatment modalities include diagnostic and therapeutic nerve blocks, behavior modification via biofeedback and stress reduction, physical therapy and transcutaneous nerve stimulation, individualized drug regimens for cancer patients, and referral to other Stanford specialty clinics. Students may also learn to perform epidural, spinal, and peripheral nerve blocks and observe procedures performed with fluoroscopic and ultrasound guidance. In addition to the outpatient Pain Management Clinic, the Pain Management Services oversees the treatment of patients with postoperative pain and acute on chronic pain on the Acute Pain Service which involves daily teaching and work rounds beginning at 7:00 am at the Stanford Hospital where students participate as part of a team in implementing multimodal and interventional management strategies. Please note: Visiting students must obtain approval from Yun Tao prior to applying for this clerkship. Please email requests to yuntao@stanford.edu. Prereq: Clinical experience. Periods Avail: 1-12 for 2 or 4 weeks. 2 students per period. Reporting Instructions: Contact Alyssa Martinez at amart10@stanford.edu for instructions/ directions. Units: 3 or 6. Call Code: 0 Director: Anuj Aggarwal, M.D. (akaggarw@stanford.edu). Other Faculty: Pain Management Faculty. Coord: Yun Tao (650-724-1706, yuntao@stanford.edu)., (SUMC, SMOC).

ANES 306A. Critical Care Core Clerkship. 6 Units. 
Required Clerkship. Closed to visitors. Provides experience managing adult patients in a critical care unit. Students learn how to optimize care for the acutely ill patient and the multidisciplinary approach to complex patients. Teaching emphasizes the review of basic organ physiology, the ability to determine the pathophysiologic mechanisms involved in critical illness, and the formulation of a physiologic based treatment plan. Students gain experience with the implementation of monitoring and therapeutic devices used in the intensive care units and begin to become adept at the evaluation, stabilization and management of the most critically ill patients expected to be encountered in today’s acute care hospitals. Ward rounds, bedside evaluation and treatment, and individual interactions with attending, fellows and residents are part of the educational process. Assignments will be made either to the Stanford Medical-Surgical ICU Service, Stanford Surgical ICU Service, or the Palo Alto Veterans Administration Hospital Medical-Surgical ICU Service. Student preferences for a particular adult ICU site will be given consideration but cannot be guaranteed. Absences during the 306A clerkship: Students must contact the 306A Clerkship Director to obtain explicit advance approval for any planned absence from the clerkship. Unanticipated absences for illness or emergency must be communicated to the Clerkship Director as promptly as possible. Students with more than 2 days of unexcused absences (i.e., 3-5 days) will be required to make up one week at a later date. If the absence is longer, the time will be proportionately increased. Taking extra night or weekend call will not be considered a suitable substitute for missing weekdays during the clerkship. Arrangements to make up missed time must be made by the student with the 306A Clerkship Director. Students who anticipate missing a week (i.e., 5 weekdays) or more of the 306A Clerkship are encouraged to reschedule this clerkship during a different period. Students who miss either of the day-long ICU Medical Student Simulator courses will need to make these experiences up at a later date in order to receive a passing grade for this clerkship. Prerequisites: Adult: Med 300A and Surg 300A. (SUMC, PAVAMC).
ANES 307A. Cardiovascular Anesthesia Clerkship. 3 Units.
Open to visitors. A two-week clerkship that gives the student exposure to the principles and practice of cardiovascular anesthesia, including applied cardiovascular physiology and pharmacology. You will work in the cardiovascular operating room and cath lab with faculty, fellows and residents, providing care to adult patients undergoing cardiac and vascular procedures. You will gain experience in the preoperative evaluation of compensated and decompensated (sick) patients; clinical application of physiologic principles (e.g., myocardial oxygen balance and ventricular function curves); applied monitoring; use of potent inotropic, vasodilator and other hemodynamic drugs; application of cardiac pathophysiology to clinical care; considerations for urgent/emergent, minimally invasive, and catheter based procedures; and may assist in placement of monitoring lines and devices. Please note: Visiting students must obtain approval from Yun Tao prior to applying for this clerkship. Email requests to yuntao@stanford.edu. Prerequisites: Anesthesia 300A, 300B, 300C, or 300D plus 6 months of clinical clerkships. Reporting instructions: Where: TBA (designated faculty preceptor); Time: TBA. (SUMC, PAVAMC, SCVMC, KPMC).

ANES 308A. Associated Anesthesiologists Community Anesthesia Clerkship. 3-6 Units.
Open to visitors. Exposes students to the fundamentals of community anesthetic practice in the Stanford Hospital Operating Room and in four private operating room sites. In the Stanford Hospital clinical setting, under close preceptor supervision (by a private anesthesiologist faculty member), students have the opportunity to learn principles of preoperative evaluation of patients, intraoperative monitoring techniques, assessment of cardiovascular and respiratory status, and the opportunity to learn a variety of technical skills including airway management, endotracheal intubation, and intravenous placement, which will be of value in any clinical specialty. Didactic lectures and clinical conferences are available during this rotation. Students will work closely with their preceptor during the two-week clerkship. As all the patients on this rotation are private, in the non-Stanford Hospital locations the student will be able to observe but not do procedures. Students must obtain approval prior to registering for this clerkship. Prerequisites: A major clerkship in medicine or surgery is strongly recommended. Reporting instructions: Where: Control Desk at Stanford Hospital Operating Room (contact Dr. Richard Novak by email three to four weeks before); Time: 6:55 am. (SUMC).

ANES 340B. Critical Care Clerkship. 6 Units.
Open to visitors. This clerkship provides experience managing adult patients in a critical care unit. Students learn how to optimize care for the acutely ill patient and the multidisciplinary approach to complex patients. Teaching emphasizes the review of basic organ physiology, the ability to determine the pathophysiological mechanisms involved in critical illness, and the formulation of a physiologic based treatment plan. Students gain experience with the implementation of monitoring and therapeutic devices used in the intensive care units and begin to become adept at the evaluation, stabilization and management of the most critically ill patients expected to be encountered in today’s acute care hospitals. Ward rounds, bedside evaluation and treatment, and individual interactions with attending, fellows and residents are part of the educational process. Students must attend mandatory simulator courses in order to receive passing grade for this clerkship. Students wishing to do this clerkship must get approval from Bernadette Carvalho first before registering. Prerequisites: Anesthesia 306A or Medicine and Surgery core clerkships. Reporting instructions: Where: PAVAMC, MSICU, 3rd Floor; Time: 8:00 am. (PAVAMC).

ANES 370. Medical Scholars Research. 4-18 Units.
Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

ANES 398A. Special Clinical Elective in Anesthesia. 3-6 Units.
Open to visitors. Provides an opportunity for a student in the clinical years to have an individualized clinical experience in Anesthesia. The student may elect to arrange a clerkship either with a specific faculty member or gain experience in a particular select area of Anesthesia not readily available by clerkship designation. The duration and content of the clerkship will be decided upon by the student and a faculty preceptor in the Department of Anesthesia. Arrangement and inquiries regarding this clerkship should be made with Dr. Marianne Chen. Please note: Students cannot add 398A clerkships directly to their fishbowl schedules through the regular shuffles. Please contact Caroline Cheang in the Office of Medical Student Affairs at cheang@stanford.edu or 650-498-7619 with the faculty preceptor’s name and email address to add this clerkship. Prerequisites: Consent of the designated Faculty preceptor. Reporting instructions: Where: TBA (designated faculty preceptor); Time: TBA. (SUMC, PAVAMC, SCVMC, KPMC).

ANES 399. Graduate Research. 1-18 Unit.
Students undertake investigations sponsored by individual faculty members. Problems related to metabolism, toxicity, and mechanisms of anesthesia; pharmacologic studies involving pain management; the genetic and molecular basis of hemodynamic insufficiency. Animal studies may be included. Interested students should contact Drs. Trudell, Maciver, Clark, Giffard, Patterson, Angelotti, Drover, Chu, or Angst.

ANES 70Q. Critical Illness: Patients, Physicians, and Society. 3 Units.
Examines the various factors involved in shaping the critical care illness experience for three groups of people: the clinicians, the patients, and patients’ families. Medical issues, economic forces and cost concerns, cultural biases, and communication errors can all influence one’s perception. Helps students understand the arc of critical illness, and how various factors contribute to the interactions between those various groups. Includes an immersion experience (students are expected to round with clinicians in the ICU and to attend Schwartz rounds, a debriefing meeting about difficult emotional situation) and a mentoring experience (with critical care fellows), in addition to routine class work.

ANES 72Q. The Art of Medical Diagnosis. 3 Units.
The Art of Medical Diagnosis: Enhancing Observational Skills through the Study of Art is an interactive, multidisciplinary undergraduate course that explores various ways in which studying art increases critical observational skills vital for aspiring healthcare providers. Students will be introduced to the concept of ‘visual thinking strategies’ through classroom, art creation, and museum-based activities. Students will apply these skills to both works of art and medical cases. Significant focus will be on engaging in group discussions where they will collaboratively use visual evidence to generate and defend hypothesis. Drawing and sketching from life will play a critical role in honing observational skills through weekly assignments, workshops, and a final project. The interactive nature of this course pivots students away from a typical lecture-based course to a self-directed learning experience.

ANES 74Q. Mending a broken heart: The Anatomy, Physiology and Psychology of congenital heart disease. 3 Units.
Congenital heart defects are the most common type of birth defects and with improvements in surgical techniques and medical care these babies are living longer and healthier lives. Data indicates that approximately 1 million US children and 1.2 million US adults are living with congenital heart disease. Treating congenital heart disease requires an intimate understanding of complex embryology, anatomy and physiology. In this seminar we will look at the fascinating spectrum of anatomical changes that occur in some common congenital heart defects and how these changes can be corrected with various surgical procedures and medical care. Lectures will draw from real patient cases and students will have the opportunity to visit the Stanford Anatomy Lab, engage with virtual reality models of the heart, learn the basics of cardiac ultrasound, and hear from some of the frontline anesthesiologists, surgeons, cardiologists and patients who straddle the line between life and death on a daily basis.