Anatomy, Physiology & Pathophysiology II
CRNA 7301
Spring 2026
Semester 2

Scheduled Class Days and Times:
Fridays 1-4 pm (or TBD)

Classroom: SMILE Center North Campus or MEB

Instructor's Name:
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Adjunt Instructor: Carlso Martinez-Diaz, Master Anatomist UT Tyler SOM

Catalog page for this course

Course Description:

This is the second of a three semester advanced level series covering Anatomy, Physiology, and Pathophysiology geared towards graduate level nurse anesthesia residents obtaining a Doctor of Nursing Practice in Nurse Anesthesia. The course will be partly system based incorporating anatomy, physiology, and pathophysiology in an integrated fashion. In addition, this course will provide a comprehensive understanding of biochemistry in both normal and pathologic conditions There will be integration and spiraling of the content throughout the 3 semesters. Nurse anesthesia residents are expected to be able to recall and apply knowledge from prior material throughout the three courses.

Overall Course Objectives (all 3 semesters):

These objectives aim to provide nurse anesthesia residents with a comprehensive

foundation in anatomy, physiology, and pathophysiology, crucial for effective and safe anesthesia practice for patients across the entire life span.

Anatomy

1) Fundamental Understanding: Comprehend the basic structure and function of the human body, including major organ systems, tissues, and cells.
2) Regional Anatomy: Identify and describe the anatomical landmarks, features, and structures of the head, neck, thorax, abdomen, pelvis, and extremities relevant to anesthesia practice.
3) Neuroanatomy: Understand the anatomical organization of the central and peripheral nervous systems and their significance in anesthesia.
4) Cardiovascular and Respiratory Systems: Explain the anatomical structures of the cardiovascular and respiratory systems and their importance in anesthesia administration.
5) Clinical Application: Apply anatomical knowledge to clinical scenarios, such as intubation, vascular access, and regional anesthesia techniques.

Physiology

6) Cellular and Molecular Basis: Understand the physiological principles at the cellular and molecular level, including membrane potentials, action potentials, and cellular communication.
7) Systemic Physiology: Explain the normal function of major organ systems (cardiovascular, respiratory, renal, hepatic, gastrointestinal, endocrine, and nervous systems) and their interactions.
8) Homeostasis and Regulation: Describe the mechanisms of homeostasis and the physiological regulation of body functions.
9) Physiological Response to Anesthesia: Understand the physiological responses to anesthesia and surgical stress, including the impact on different organ systems.
10) Pharmacodynamics and Pharmacokinetics: Relate physiological principles to the pharmacodynamics and pharmacokinetics of anesthetic agents.

Pathophysiology

11) Disease Mechanisms: Understand the pathophysiological mechanisms underlying common diseases and disorders, particularly those affecting surgical and anesthetic outcomes.
12) Organ Dysfunction: Describe the pathophysiology of organ dysfunctions and failures, including cardiovascular, respiratory, renal, hepatic, and neurological systems.
13) Impact of Chronic Conditions: Analyze how chronic conditions such as diabetes, hypertension, and obesity affect anesthesia management and patient outcomes.
14) Acute and Critical Conditions: Identify and understand the pathophysiology of acute and critical conditions, including trauma, sepsis, and shock.

15) Diagnostic and Monitoring Tools: Use pathophysiological knowledge to interpret diagnostic tests and monitoring tools relevant to anesthesia practice, such as ECG, blood gases, imaging, and hemodynamic monitoring.
16) Case-Based Learning: Apply pathophysiological concepts to case studies and clinical scenarios, enhancing critical thinking and decision-making skills in anesthesia care.

Student Learning Outcomes Semester 2:

Advanced Anatomy, Physiology, Pathophysiology, and Pathology 2: biochem, metabolism, molecular biology, nutrition, abdomen pelvis endocrine/regulation

A) Anatomy, Physiology, and Pathophysiology of the Abdomen-GI, Pelvis, Endocrine, and Reproductive Systems: These objectives aim to provide the nurse anesthesia resident with a comprehensive understanding of the anatomy, physiology, and pathophysiology of the abdomen-GI, pelvis, endocrine, and reproductive systems, essential for effective anesthesia management in diverse clinical scenarios.

Anatomy

1. **Abdominal Anatomy**: Identify and describe the anatomical structures of the abdominal cavity, including the major organs of the gastrointestinal (GI) tract (esophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas).
2. **Pelvic Anatomy**: Understand the anatomical features of the pelvic region, including the bladder, rectum, reproductive organs, and the pelvic floor.
3. **Endocrine System**: Describe the anatomical locations and structures of the major endocrine glands (pituitary, thyroid, parathyroid, adrenal glands, pancreas, and gonads).
4. **Reproductive Anatomy**: Identify the anatomical structures of the male and female reproductive systems, including the testes, ovaries, uterus, and associated ducts.
5. **Clinical Relevance**: Apply anatomical knowledge to clinical procedures such as abdominal surgery, pelvic surgery, and endocrine gland surgery.

Physiology

1. **GI Physiology**: Explain the physiological processes of the gastrointestinal system, including digestion, absorption, motility, and secretion.
2. **Pelvic Physiology**: Understand the physiological functions of the pelvic organs, including micturition, defecation, and sexual function.
3. **Endocrine Physiology**: Describe the hormonal regulation of metabolism, growth, stress response, and homeostasis by the endocrine system.
4. **Reproductive Physiology**: Explain the physiological processes of the male and female reproductive systems, including gametogenesis, hormonal regulation, and the menstrual cycle.

5. **Integrated Physiology**: Describe how the GI, pelvic, endocrine, and reproductive systems interact and influence each other to maintain overall health and homeostasis.

Pathophysiology

1. **GI Pathophysiology**: Understand the pathophysiological mechanisms underlying common GI disorders
2. **Pelvic Pathophysiology**: Describe the pathophysiological changes associated with pelvic conditions
3. **Endocrine Pathophysiology**: Understand the pathophysiology of endocrine disorders such as diabetes mellitus, thyroid diseases, adrenal insufficiency, and pituitary disorders.
4. **Reproductive Pathophysiology**: Explain the pathophysiological mechanisms of reproductive system disorders, including infertility, polycystic ovary syndrome (PCOS), endometriosis, and prostate disease.
5. **Disease Impact on Anesthesia**: Evaluate how GI, pelvic, endocrine, and reproductive pathologies affect anesthesia management and patient outcomes.
6. **Diagnostic and Monitoring**: Use pathophysiological knowledge to interpret diagnostic tests and monitoring data relevant to these systems, such as liver function tests, hormone levels, and imaging studies.
7. **Case Studies**: Apply pathophysiological concepts to clinical case studies, enhancing critical thinking and decision-making skills in anesthesia care for patients with abdominal, pelvic, endocrine, and reproductive conditions.

B) Biochemistry in Normal and Pathologic Conditions: These objectives are designed to provide CRNA students with a comprehensive understanding of biochemistry in both normal and pathologic conditions, essential for advanced anesthesia practice and patient care.

Biochemistry

1. **Fundamental Principles**: Understand the basic principles of biochemistry, including the structure and function of biomolecules such as proteins, lipids, carbohydrates, and nucleic acids.
2. **Metabolic Pathways**: Describe key metabolic pathways (glycolysis, Krebs cycle, oxidative phosphorylation, and lipid metabolism) and their regulation.
3. **Enzyme Function**: Explain the principles of enzyme function, including kinetics, regulation, and the role of coenzymes and cofactors.
4. **Acid-Base Balance**: Understand the biochemical basis of acid-base balance, including the role of buffers, the Henderson-Hasselbalch equation, and the physiological impact of acid-base disturbances.
5. **Clinical Relevance**: Apply biochemical principles to clinical scenarios, such as the metabolic effects of anesthesia, the impact of fasting and feeding states, and the biochemical basis of drug action.

Pathologic Conditions

1. **Metabolic Disorders**: Understand the biochemical and molecular basis of common metabolic disorders, such as diabetes mellitus, hyperlipidemia, and inborn errors of metabolism.
2. **Neurobiology**: Describe the molecular basis of neurological disorders, such as Alzheimer's disease, Parkinson's disease, and epilepsy, and their impact on anesthesia care.

Clinical Application

1. **Case Studies**: Apply biochemical and molecular biology concepts to clinical case studies, enhancing critical thinking and decision-making skills in anesthesia care.
2. **Diagnostic Interpretation**: Use biochemical and molecular knowledge to interpret diagnostic tests, such as blood gases, and metabolic panels
3. **Patient Management**: Integrate biochemical principles into the management of patients with metabolic, and molecular pathologies in the perioperative setting.
4. **Drug Mechanisms**: Understand the molecular mechanisms of anesthetic agents and adjunct drugs, including their metabolism, mechanism of action, and potential adverse effects.
5. **Research and Innovation**: Encourage engagement with current research and innovations in biochemistry that have implications for anesthesia practice.

Prerequisites or Co-Requisite:

CRNA 7300

Required Textbooks:

Hall JE, Hall ME. *Guyton and Hall Textbook of Medical Physiology*. 14th edition. Elsevier; 2020.

Course Schedule/Weekly Calendar

Up-to-date information on readings, pre-class actions, in-class actions, and graded assignments can be found within the **Weekly Modules** tool on **Canvas**. Didactics and lab will employ active learning strategies. Preparation prior to didactics and lab is necessary to apply

Week	Date	Topic	Assignment
1	1/6/26	Anatomy-Renal Physiology- Renal Biochemistry- Cellular Respiration/Krebs cycle Abdominal Wall	
2	1/23/26	Anatomy and Physiology-Abdomen-Stomach Biochemistry- Cellular Respiration 2 Foregut, PUD	
3	1/30/26	Anatomy and Physiology- Abdomen/GI Biochemistry and Pathophysiology- Acid-Base 2 renal compensation, Midgut	
4	2/6/26	Anatomy and Physiology/Pathology- Abdomen/GI Liver and Pancreas and Spleen	
5	2/13/26	Anatomy and Physiology= Thyroid Biochemistry and Pathophysiology Thyroid Function and signaling.Hindgut	
6	2/20/26	Biochemistry and Pathophysiology- Adrenal Function and Signaling Retroperitoneum	
7	2/27/26	Biochemistry and Pathophysiology -Calcium and Phosphate metabolism, Parathyroid	

8	3/6/26	**Midterm**	
9	3/9-13/26	SPRING BREAK	
10	3/20/26	Anatomy- Pelvis 1 Biochemistry and /Molecular Biology- Cell Signaling and receptors, hormones Pelvic Anatomy 1 Biochemistry and Molecular Biology- Cell Signaling and receptors Pelvic Anatomy 2	Note 2 sessions this week
11	3/27/26	Anatomy- Pituitary and Eye Biochemistry and /Molecular Biology- Pituitary and signaling	
12	4/3/26	Anatomy and Physiology- Reproductive 1 Biochemistry and Molecular- Repro Physiology	
13	4/10/26	Anatomy and Physiology- = Molecular- Meiosis and Mitosis	
14	4/17/26	Molecular- Cancer Biology Path- Lymphoma and leukemia	
15	4/24/26	**Finals**	

Assessment and Remediation:

The passing grade for this course is 80% or greater. Passing grade for a Summative Midterm and Summative Final will be 80%. Nurse anesthesia residents must pass the Summative Final to pass the course. Nurse anesthesia residents who are unsuccessful on first attempt on the Summative Final will be required to undergo remediation, and focused reassessment including a retest and/or written and oral presentation of critical concepts. Successful remediation and reassessment will result in a maximum score of 80% for this component. Nurse anesthesia residents who do not achieve a passing score of 80% on the remediation and reassessment will receive a failing grade for the course. A student who does not pass a course will be referred to the Student Progression Committee for next steps which could result in dismissal from the program, or taking a leave of absence and returning the following year to retake the course and subsequent courses. A student cannot progress to the next semester if they are unsuccessful in their remediation and reassessment.

Assignments and Weights/Percentage/Point Values

Grades will not be rounded up. Nurse anesthesia residents will be evaluated according to the following:

Category/Item	**Percentage (of total grade)**
Worksheets x 4	10%
Formative Quizzes x2	20%
Summative Midterm- Written and Practical	30%
Summative Final- Written and Practical	40%
Total	**100%**

Grading Scale:

Specific guidelines and grading criteria for all assignments are in the Modules. Final grades for the course will be determined based upon the following point assignments:

A - 90-100
B - 80-89
C - 70-79
D - 60-69
F - Below 60

Grades will not be rounded when calculating the average (79.5 is not rounded to 80, and 89.5 is not rounded to 90). The simple average of all unit exam grades, including a final must be at or above 80% to pass the course. Once the student has achieved a simple unit exam average of

80% or higher, course grades will be determined based on the weighted calculation of exams and other required course work. Nurse anesthesia residents are required to achieve an average of 80% (B) to complete the course successfully.

Failure of the Final Written or Practical Exam will require remediation and 1 retake opportunity of the failed component.

There are no retakes for the Midterm

A student with a failing grade will be refered to the SONProgressions Committee and may be offered remediation and restesting

- Nurse anesthesia residents will have 72 hours after an item grade posts to Canvas in which to request a grade adjustment from the course instructor of record.
- This course is subject to the exam failure policies described in the Student Academic Progress section of the Nursing Science and Healthcare Leadership Graduate Group General Student Handbook."

  https://www.uttyler.edu/registrar/registration/withdrawals.php

Absences, Late Assignments, and Participation *(course policies, see final pages of syllabus for schoolwide policies)*

Evaluated Work

- The course grade will be assessed based on the following work:

Worksheets: These are formative in nature allowing nurse anesthesia residents to demonstrate their knowledge and assess their progress and understanding. Answer keys will be released after submission for self-grading by nurse anesthesia residents.

Quizzes: There will be three formative quizzes that will help nurse anesthesia residents prepare for the summative midterm and final. These will count for a percentage of final course grade.

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Summative Midterm: The midterm will consist of both a written MCQ exam covering anatomy, physiology, and pathophysiology as well as a practical exam. The practical exam will be integrated questions in a short answer format. A single combined score will be given for these two components. They will each contribute to approximately 50% of the total midterm grade.

Summative Final Exam: The cumulative final exam will consist of both a written MCQ exam covering anatomy, physiology, and pathophysiology as well as a practical exam. The final practical exam will be integrated questions in a short answer format. A single combined score will be given for these two components. They will each contribute to approximately 50% of the total grade. The final exam will include material from the first half of the semester in addition to the new material following the midterm exam. Nurse anesthesia residents are expected to integrate this material.

Exam and homework materials, questions, and problems are the intellectual property of faculty, UT Tyler, or publishers.

- These materials may not be distributed without permission.
- Distributing or uploading them to online resources destroys the integrity of the assignment and the course, allowing others an unfair advantage by letting them view the materials.
- Uploading these materials to online resources is a violation of UT Tyler's academic misconduct policies and may result in formal conduct charges.
- Sanctions for uploading or otherwise divulging the contents of these materials can include:
  - a reduced or failing grade on an assignment
  - a reduced or failing grade for the course
  - removal from the Nursing program
  - removal from UT Tyler

Dress Code

Nurse anesthesia residents should dress in suitable business casual or office attire that is neat, clean, and appropriate for the workplace for any non-lab activities. For any lab sessions nurse anesthesia residents should wear clean, solid-colored scrubs with closed toe shoes.

Student Feedback

Program improvement through comprehensive evaluation is a vital part of ensuring the vitality and success of the Program. Your voice as a student will help to shape the program as it grows. We expect all nurse anesthesia residents to participate in all online evaluations that occur mid-semester and at the end of each semester.

Codes of Conduct

Code of Academic Conduct

All members of the academic community are responsible for academic integrity. Existing policies forbid cheating on examinations, plagiarism, and other forms of academic dishonesty. Academic dishonesty is contrary to the purposes of the University of Texas and is not to be tolerated.

Academic Integrity: Cheating of any kind, as defined in Section 8 of the UT Tyler Manual of Policies and Procedures (MOPP) for Student Affairs (https://www.uttyler.edu/mopp/), will not be tolerated. Consequences may include:

- reprimand
- exam failure
- course failure
- expulsion from the Nursing program
- expulsion from the University
- other consequences as assigned

Professionalism *to be discussed*

This course includes a professionalism component with grade options of Satisfactory (S), Needs Improvement (N), and Unsatisfactory (U). The professionalism component must be passed in order to pass the course. A professionalism grade of S or N has no impact on the course grade. A professionalism grade of U will result in a failing course grade regardless of numerical course average. Expected professional behaviors are detailed on the School of Nursing Statement on Professionalism at…..

IMPORTANT: This professionalism grade is separate from any course-specific graded items that focus on professional behavior/attendance/participation during class times.

Significant Professional Breaches

The list of behaviors below are examples of professional breaches that could lead to disciplinary action by a health care employer or licensing board. If exhibited during or associated with a student's clinical activities, these behaviors and other conduct contrary to the standards of professionalism may result in course failure. Other sanctions, including but not limited to dismissal and disqualification, may also be applied.

- Violation of patient confidentiality or HIPAA violation
- Disparaging a patient in a public setting (including through social media)
- Failure to respect appropriate professional boundaries interactions with patients and others in the health care environment
- Discrimination against, harassment of, or failure to care for a patient based on his or her race, age, gender, religion, national origin, medical condition, physical or mental disability, ancestry, marital status, sexual orientation, citizenship, ability to speak English or status as a covered veteran
- Failure to recognize and understand professional and personal limitations
- Use of legal or illegal substances that could impair judgment
- Gross negligence or gross neglect
- Fabrication, falsification or intentional omission of written or verbal clinical data
- Refusal to perform tasks as directed by clinical supervisor or preceptor
- Providing care to a patient in contravention of clinical supervisor's or preceptor's instructions

Special Note: For Anatomy lab human Plastinates and prosected cadavers will likely be used. These are to be shown the utmost respect and care as one would show towards a patient.

Course Expectations

Attendance

Student attendance is required in all lab sessions. Nurse anesthesia residents are allowed two excused and one unexcused absence per semester. Nurse anesthesia residents should not come in if ill and likely contagious to protect their colleagues. This is considered an excused absence. If a student is to be out more than two days a Clinician note is required upon return. It is the nurse anesthesia residents responsibility to keep up on the material by obtaining material from their fellow nurse anesthesia residents.
In the event that a student is unable to attend the class, they must email the instructor *prior to the class session* from which they will be absent. It is also the student's responsibility to then follow-up with the instructor to determine what information was missed during their absence and complete any make-up assignments as deemed appropriate by the instructor

Class Participation

Nurse anesthesia residents are expected to come prepared to participate in class exercises and discussions based on the pre-class actions.

Electronic Assignment Submission

Nurse anesthesia residents are expected to submit all assignments electronically through Canvas unless otherwise specified by the instructor. Assignments should be submitted in standard formats (e.g. .docx, .pptx, etc.) and not as in-line text.

Late Assignments

Nurse anesthesia residents are expected to turn assignments in on time. We do understand there are situations that may preclude nurse anesthesia residents being able to complete assignments as expected. In such a situation, nurse anesthesia residents are expected to communicate with instructors as far ahead as possible and prior to assignment due date to discussion alternate arrangements (at the discretion of the instructor). Failure to let the Faculty know that an assignment will be late ahead of time, can result in no credit for that assignment. Not completely an online quiz on time without a valid reason will result in a 10% deduction in score fore very 24 hours it is late.

Student Resources and University Policies are provided in Canvas.

<u>Accommodations</u>

Nurse anesthesia residents with established or potential disabilities: Our program is

committed to all nurse anesthesia residents achieving their potential. If you have a disability or think you may have a disability (physical, hearing, vision, psychological and learning disability) which may need a reasonable accommodation, please contact the. Because accommodations can take time to implement, it is important to have this discussion as soon as possible. All information regarding a student's disability is kept in accordance with relevant state and federal laws.

Support for Student Learning

Please notify faculty if you are having any difficulty with this course, such as challenges understanding assignments or expectations. Our goal is to help you learn, and we want you to be successful. You can make an advising appointment at any time during the semester.

Artificial Intelligence Information: The University of Texas at Tyler presents an AI definition, content for instructors, content for nurse anesthesia residents, and AI plagiarism awareness information. Check it out! Artificial Intelligence (uttyler.edu).

School of Nursing Policies and Additional Information:

https://www.uttyler.edu/nursing/college/student_guide_and_policies.php