COURSE DESCRIPTIONS and STUDENT LEARNING OBJECTIVES

**NA640 Chemistry & Physics for Nurse Anesthesia - 4 Credits**
This course examines the principles of inorganic chemistry, organic chemistry, biochemistry and physics as they apply to the practice of anesthesia and anesthetic pharmacology. Topics include anesthesia delivery systems, delivery of inhalation anesthetics, fluid and gas mechanics, laser technology, radiology and nuclear medicine, ultrasonography, electricity, and magnetism among others.

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Apply principles of inorganic chemistry, organic chemistry, biochemistry and physics to anesthetic pharmacology.
2. Apply principles of inorganic chemistry and physics to anesthesia delivery systems and monitoring.
3. Apply principles of fluid and gas mechanics to anesthesia delivery and anesthetic pharmacology.
4. Apply concepts of laser technology to safe patient care.
5. Apply theories related to radiology, nuclear medicine, and magnetism to the interpretation of diagnostic data and the provision of safe patient care.
6. Apply principles of ultrasonography to the safe administration of regional anesthetics and intravenous access.
7. Discuss the ramifications of electrical safety and their applications to anesthesia and surgery.

**NA635 Professional Communication - 3 Credits**
This course introduces the student to the expectations and conventions of graduate writing and research in the medical field. Topics include: modes of professional communication, AMA standards and conventions, essential elements of medically related reports such as clinical case studies, insurance and quality assurance reports; professional correspondence, integrative and systematic reviews, library research tools and methods, and meta-analysis. The ethical and legal ramifications of professional communication are addressed.

**Prerequisites:** Concurrent enrollment in NA606.

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Apply a process approach to develop an effective writing technique
2. Develop awareness of audience in written communications.
3. Display mastery of grammar and style in writing.
4. Display mastery of AMA style and formatting.
5. Conduct a review of the literature on a specific topic.
6. Discuss the ethical and legal ramifications of research.
7. Critically evaluate research writing.
8. Demonstrate professional and effective writing and presentation skills.

**NA606 Research Design and Statistical Analysis - 3 credits**
The course provides an overview of research methods commonly used in clinical anesthesia, nursing and medicine. Topics include research methodology, statistical analysis, probability, risk assessment, decision-making, use of computer software, data analysis, graphical techniques, and electronic communications. The course focuses on the interpretation and understanding of research and applied statistical procedures.
Student learning objectives
Upon completion of this course, the student is expected to be able to:
1. Understand statistical theory and research methodological theory.
2. Understand basic descriptive statistics and the fundamentals of hypothesis testing.
3. Apply appropriate research and statistical methods to research questions.
4. Recognize the appropriate applications of statistical findings and their limitations.
5. Evaluate research presented in the anesthesia, nursing and medical literature.
6. Perform (via hand or via computer software), interpret and report basic statistical analyses.
7. Discuss ethical practices in relation to the appropriate use and interpretation of research in clinical, professional, and research practice.
8. Analyze, compare and critique quantitative research published in peer-reviewed journals.
9. Identify a research question, evaluate inferential studies, draw conclusions from data analyses, assemble graphical and numerical summaries, present comparative results to others.
10. Respond to reasonable questions about the review of research.

NA630 Professional Aspects of Nurse Anesthesia - 3 credits
This course presents material concerning issues surrounding the discipline of Nurse Anesthesia as a profession. Topics include the qualifications and capabilities of the Nurse Anesthetist, professional roles and responsibilities, committing to professional involvement, the American Association of Nurse Anesthetists as a professional organization, the governmental and non-governmental regulation of Nurse Anesthesia practice, Standards of Care, professional reimbursement, health care marketplace trends, influencing health care policy, assessing and selecting CRNA practice settings, the American Legal System and its impact on CRNA practice, the anatomy of malpractice litigation, clinical competency, continuous quality improvement, cultural competency, ethical issues and decision making.

Prerequisites: none.

Student Learning Objectives
Upon completion of this course, the student is expected to be able to:
1. Identify the clinical capabilities of the Certified Registered Nurse Anesthetist.
2. Describe key components of the CRNA scope of practice.
3. Describe the Certification and Recertification requirements for CRNA's, including the role of the NBCRNA.
4. Define “Professionalism” within the context of the Nurse Anesthesia profession
5. Describe the major characteristics of professional behavior.
6. Describe the role of professional organizations in terms of member support services and the association’s accountability to the public.
7. Recount the historical development of the American Association of Nurse Anesthetists.
8. Describe the philosophy and objectives of the AANA.
9. Describe the historical development of state and federal regulation of nursing and medical practice.
10. Discuss the methods used by individual states to regulate nursing practice.
11. Describe the interstate licensing compact model
12. Outline various credentialing models for clinical privileges.
13. Relate the concept of “continued competency” to the practice of Nurse Anesthesia.
14. List the current AANA “Standards for Nurse Anesthesia Practice”.
15. Explain the relationship between Standards of Practice, Position Statements and the professional Code of Ethics.
16. Describe a conceptual framework that supports ethical decision making.
17. Identify sources of professional standards.
18. Describe the historical development of the American Health Care System.
19. Explain issues associated with the current American health care delivery system.
20. Identify current and future trends affecting the US health care delivery system.
21. Explain how one influences the legislative process.
22. Describe possible practice settings for nurse anesthetists.
23. Relate reimbursement for professional services to these practice settings.
25. Identify sources of law in the United State, including the Legislature, Courts, Common Law, Executive Branch and Administrative/Regulatory agencies.
26. Discuss Tort Liability as it relates to standards of care and the concept of negligence.
27. Define the concepts of vicarious liability, malpractice and res ipsa loquitor.
28. List the common steps of a professional negligence lawsuit.
29. Identify general trends in tort reform.
30. Itemize the essential elements of patient care documentation.
31. Define “competence” as it relates to the CRNA.
32. List traditional competency measures and future trends in assuring competency.
33. Define Continuous Quality Improvement and describe models applicable to the Anesthesia Profession.
34. Describe major ethical theories and the principles of autonomy, nonmalice, beneficence, and justice.
35. Identify pertinent ethical issues facing the Nurse Anesthetist.
36. Discuss the legal and ethical issues that impact chemical dependency in the Nurse Anesthesia profession.
37. Define “cultural competency” and its application to nurse anesthesia practice.

**NA651 Pharmacology for Nurse Anesthetists - 3 credits**

This course introduces basic principles of pharmacology and focuses on those drugs most often used in the practice of anesthesia. The course provides an overview of drug actions, interactions, metabolism, methods of administration, dosages, side effects, precautions, and contraindications.

**Prerequisite:** NA640.

**Student Learning Objectives**

Upon completion of this course, the student is expected to be able to:
1. Possess a broad in-depth knowledge and understanding of the pharmacology of anesthetic agents.
2. Explain the principles of pharmacokinetics and pharmacodynamics.
3. Describe, for each of the major classes of anesthetic agents and adjuncts presented, the pharmacokinetics and pharmacodynamic characteristics, methods of administration, dosages, side effects, precautions, and contraindications.
4. Describe the administration of general and regional anesthetic agents to all ages and categories of patients.
5. Understand the use of a broad variety of anesthetic and adjunctive agents in anesthesia care.
6. Evaluate the patient’s medication history and propose additional diagnostic data as indicated.
NA645  Anatomy & Physiology I - 6 credits
The first in a series of two courses, this course will concentrate on the anatomy and physiology of cells, muscles, the central and peripheral nervous systems, upper airway anatomy and the renal system.

Prerequisite: NA640.

Student Learning Objectives
Upon completion of this course, the student is expected to be able to:
1. Identify the anatomic structures of the adult airway.
2. Describe nerve innervation and blood flow to the upper airway.
3. Describe the structure and function of the cell and the organization of cells within tissues
4. Specify the body fluid compartments and their composition.
5. Explain the mechanisms by which substances are transported across cell membranes.
6. Summarize the anatomy and function of the neuron.
7. Identify the neurotransmitters in the central and peripheral nervous systems.
8. Describe the organization of the nervous system and the anatomy of critical structures.
9. Discuss the anatomy and regulation of the cerebral circulation.
10. Describe the formation and flow of cerebrospinal fluid.
11. Explain the role of the blood brain barrier.
12. Differentiate between sensory nerves and receptors in terms of anatomy and function.
13. Describe the types of sensations and sensory modalities.
14. Describe the anatomy and physiology of the special senses of vision and hearing.
15. Explain how pain is transmitted to the CNS and the role of endogenous substances in pain control.
16. Identify the location of and the anatomical structures in the motor cortex.
17. Differentiate between the motor functions of the cortex, cerebellum, and brainstem.
18. Describe how cerebral activity is controlled by the brainstem.
19. Summarize the functions of the limbic system.
20. Compare the sympathetic and parasympathetic nervous systems in terms of anatomy, function and neurotransmitters.
21. Differentiate between skeletal and cardiac smooth muscle in terms of anatomy and mechanics of contraction.
22. Describe the anatomy of the kidney.
23. Specify the functional subunit of the kidney.
24. Explain the four fundamental processes associated with the regulatory function of the kidney.
25. Discuss the renal handling of NaCl and water.
26. Summarize the distribution of total body water and the regulation of plasma osmolality.
27. Differentiate between hyper- and hyponatremia.
28. Explain how the effective circulating volume is regulated.
29. Summarize potassium, calcium, and phosphate homeostasis.
30. Explain how acid-base balance is regulated.
31. Differentiate between different types of acidosis/alkalosis.
NA 614 Advanced Health Assessment for Nurse Anesthesia 2 credits.
This course builds upon health assessment skills of the practicing critical care nurse and focuses on health assessment across the human lifespan. Skills for efficiently obtaining a patient’s history with regard to psychosocial and cultural differences are discussed. Performing a focused history and physical assessment, incorporating diagnostic information, assessing on-going patient status using relevant monitoring techniques, and determining appropriate and timely intervention during the anesthetic continuum are emphasized.

Pre-Requisite: NA630

Student Learning Objectives
Upon completion of this course, the student is expected to be able to:

1. Determine physiological differences found throughout the lifespan.
2. Perform a logically sequenced patient interview and physical assessment.
3. Describe the use of monitoring technology and its application to planning care and ongoing patient assessment.

NA618 Principles of Anesthesia I – 4 credits
This course begins an in-depth study of the introductory principles of anesthesia including the basic tenants of care for the anesthetized patient. The safe use of anesthesia delivery systems and related equipment is emphasized and applied to individual patient care. Anesthetic techniques are demonstrated with their application to surgical procedures.

Prerequisities: NA630, NA640, Concurrent enrollment NA614

Student Learning Objectives
Upon completion of this course, the student is expected to be able to:

1. Apply the professional standards of practice for the certified registered nurse anesthetist with emphasis on patient safety, documentation, and legal aspects of care.
2. Discuss the technology and equipment required for safe anesthesia delivery using a variety of anesthesia delivery systems, regional anesthesia, and analgesia equipment.
3. Plan care for the challenges and complications associated with various physiological states including age, health status, structural abnormalities, and anesthesia-related complications.
4. Formulate an anesthetic management plan that includes preoperative, perioperative and postoperative assessment findings, anesthetic techniques, procedural implications, and individual patient reactions to anesthesia and surgery.

NA661 Pharmacology - 3 credits
This course focuses on the pharmacokinetics and pharmacodynamics of major drug classifications. Their interactions with anesthetic agents are discussed.

Prerequisites: NA651.
Student Learning Objectives
Upon completion of this course, the student is expected to be able to:
1. Describe the pharmacokinetic and pharmacodynamic characteristics, clinical uses, indications and contraindications, potential drug interactions, and therapeutic doses.
2. Evaluate the patient's medication history and describe additional diagnostic data needed prior to the administration of anesthesia.
3. Describe the interaction between an anesthetic and a patient’s chronic medication regime.
4. Integrate pharmacologic principles related to differing classifications of drugs into patient care plans.

NA620 Principles of Anesthesia II – 6 credits
This course is a continuance of NA 614 Advanced Health Assessment for Nurse Anesthesia and NA618: Principles of Anesthesia Practice I. Differing patient populations with acute and chronic conditions or disease states are explored in depth resulting in a comprehensive surgical care plan. This care plan is based on the perioperative patient assessment and application of general and regional anesthesia techniques. The application of general principles to individual patients is emphasized.

Prerequisites: NA614, NA618 and NA651

Student Learning Objectives
Upon completion of this course, the student is expected to be able to:
1. Formulate an anesthetic management plan that includes preoperative, perioperative and postoperative assessment findings, anesthetic techniques, procedural implications, and individual patient reactions to anesthesia and surgery for the following conditions:
   a. neuromuscular diseases
   b. autoimmune diseases
   c. endocrine disorders
   d. renal diseases
   e. liver diseases
   f. cardiovascular disorders
   g. pulmonary diseases
   h. organ transplantation
2. Integrate the implications of physiologic changes and risk factors to plan anesthetic care for mothers in vaginal and C-section deliveries including general, spinal, and epidural anesthesia.
3. Plan anesthetic care for the pediatric patient considering anatomy, physiology, psychosocial needs in the preoperative preparation of the child and family, selection of anesthetic agents, techniques for delivery, and response to complications.
4. Integrate knowledge of complications in the care of patients with various forms traumatic injury and shock.
5. Create plan of care to manage acute and chronic pain.

NA650 Anatomy & Physiology II - 5 credits
This course is a continuation of Anatomy and Physiology I. The focus is on the anatomy and physiology of the cardiovascular, respiratory, gastrointestinal, and endocrine systems. Concepts in hematology and immunology are also addressed.

Prerequisite: NA645.
Student Learning Objectives:
Upon completion of this course, the student is expected to be able to:
1. Explain the genesis and function of the various cells found in blood.
2. Describe the structure and function of the immune system.
3. Explain the mechanism of blood coagulation.
4. Describe the structures of the heart and their functions.
5. Describe the electrical and pressure-volume events that occur during the cardiac cycle.
6. Summarize the principles of electrocardiography and analysis of the electrocardiogram.
7. Differentiate between various cardiac dysrhythmias in terms of etiology and physiologic consequences.
8. Define the principal determinants of ventricular function and cardiac performance.
9. Explain how cardiac output is regulated.
10. Specify the physical and rheological properties of blood.
11. Explain the general principles of hemodynamics.
12. Outline the organization of the systemic and pulmonary circulations.
13. Describe the structural and functional characteristics of the various types of blood vessels.
14. Describe the pressure profile of the systemic and pulmonary circulations.
15. Explain how arterial blood pressure is regulated in the short term and long term.
16. Describe how and why transcapillary exchanges takes place.
17. Discuss the control of vascular smooth muscle tone.
18. Outline the coronary circulation.
19. Specify how coronary blood flow is regulated.
20. Identify the determinants of myocardial oxygen consumption.
21. Discuss the etiology and physiologic consequences of coronary artery disease.
22. Describe the anatomy of the respiratory system including airways, alveoli, circulation, innervation, and muscles of respiration.
23. Explain how elastance, compliance, surface tension, and airway resistance affect ventilation.
24. Describe the various pulmonary function tests in terms of how they are done, normal parameters, and diagnostic value.
25. Identify factors that can alter pulmonary blood flow and pressures.
26. Describe how gas exchange occurs in the lung.
27. Describe the normal distribution of blood flow and ventilation in the upright and in the supine lung.
28. Differentiate between shunt and physiologic dead space.
29. Explain how oxygen and carbon dioxide are transported in blood and body fluids.
30. Summarize the regulation of respiration.
31. Explain the physiologic alterations that occur in response to increased/decreased atmospheric partial pressure of oxygen.
32. Describe the components of the gastrointestinal system and their function.
33. Explain control of gut motility and secretory functions.
34. Discuss the structure and function of the hepatic system including how hepatic arterial and portal blood flow are regulated.
35. Describe the structure and endocrine function of each of the following: pituitary, thyroid, adrenal, and parathyroid glands; endocrine pancreas, endocrine function of the atri

NA780 Clinical Integration - 3 credits
In this course, the student integrates theory with practice by analyzing the anesthetic management of selected cases. Patient care plans are reviewed, compared and contrasted in light of actual or anticipated
outcomes. Current research is used to support patient care decisions. In addition, students have the opportunity to explore current topics and trends in anesthesia, facilitated by guest lecturers.

**Prerequisite:** Concurrent enrollment in NA771, NA635.

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Identify the variable factors that must be considered in originating an anesthesia care plan.
2. Develop and defend an anesthetic care plan for individual patients requiring an anesthetic intervention for a wide variety of causes.
3. Assess the actual delivery of patient care.
4. Evaluate patient care outcomes in terms of planned or actual care delivered.
5. Identify and describe ways in which the presented topics and trends affect the delivery of anesthesia care.

**NA632 Professional Aspects of Nurse Anesthesia Department Management – 1 credit**
The management section of Professional Aspects provides an overview of Anesthesia Department management from the perspective of the CRNA manager. The management role and responsibilities will be described and real-life case studies will be used to develop a pragmatic approach to department management.

**Prerequisites:** NA630

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Discuss theories and concepts related to management and leadership.
2. Describe the roles, responsibilities, and accountabilities of the department manager.
3. Discuss major components and elements of department management.
4. Apply the concept of pragmatic usefulness through the examination of managerial case studies.
5. Understand the emerging role of the CRNA as department manager.
6. Describe the ethical implications of managerial decisions.
7. Discuss working with diverse individuals as members of working groups.

**NA781 Synthesis Paper Proposal – 2 credits**
This course prepares students to critically analyze and develop their synthesis paper. Emphasis is placed on reviewing and analyzing the current literature, developing a relevant and timely research question, obtaining relevant references and formulating the proposal for the completion of the synthesis paper. References are analyzed in terms impacting the existing body of knowledge, applicability to the research question, interpretation of data, identification of variables and applicability to the body of current anesthesia literature.

**Prerequisites:** NA630, NA635, NA661, NA620

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Perform a review of the current literature pertaining to a topic of interest.
2. Evaluate published research in terms of appropriateness of experimental design relative to the research question, significance of findings, and limitations of the study.
3. Identify major works of research pertaining to the subject.
4. Define a set of published studies appropriate for analysis.
5. Formulate a research question to serve as the premise for the synthesis paper.
6. Use AMA style documentation when preparing references.
7. Prepare a proposal for a synthesis paper.
8. Work effectively on a project that requires collaboration.

**NA783 Synthesis Paper - 2 credits**
Students demonstrate their understanding of applicable concepts by submitting a paper to be presented to communities of interest at a later time. Concepts from the student’s coursework, experiences and related fields are represented.

**Prerequisite course:** NA781

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Prepare a comprehensive review of the literature pertaining to a topic relevant to contemporary anesthesia practice.
2. Write and submit a relevant and timely paper demonstrating understanding of the chosen topic and affiliated concepts.
3. Demonstrate proficient professional writing skills with proper usage of AMA referencing format.

**NA784 Synthesis Paper Presentation - 1 credit**
Students demonstrate their understanding of applicable concepts by presenting their synthesis paper to communities of interest. Concepts from the student’s coursework, experiences and related fields are represented.

**Prerequisite course:** NA783

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Derive audience objectives appropriate for the presentation in accordance with AANA Continuing Education guidelines.
2. Prepare slides to accompany the presentation that address the main points of the synthesis paper.
3. Present the paper to a group of interested individuals in the field of anesthesia and other related disciplines.

**NA782 Program Comprehensive Exams - 1 credit**
The student’s mastery of their anesthesia knowledge base is assessed via a series of comprehensive examinations. Examination topics include basic and advanced principles of anesthesia practice, basic sciences (anatomy, physiology, biochemistry, chemistry and physics), professional aspects of anesthesia practice, pharmacology, advanced monitoring, technology and equipment. There are five examinations in this series.

**Prerequisites:** All formal didactic coursework.

**Student Learning Objectives**
Upon completion of this course, the student is expected to be able to:
1. Demonstrate a mastery of their anesthesia knowledge base by obtaining at least seventy percent achievement level on each comprehensive examination.
NA770  Clinical Practicum I - 2 Credits
Clinical Practicum I provides the student with opportunities to apply the didactic principles of anesthesia to patient care. Students must master the basic skills and routines associated with anesthesia practice and spend time observing anesthesia and surgery in an urban medical center.

Prerequisite: NA620.

Student Learning Objectives
Upon completion of NA770, the student is expected to be able to:
1. Conduct a thorough and accurate preoperative anesthetic assessment on all assigned patients.
2. Develop a comprehensive anesthesia care plan based on data from the patient interview, medical record and anesthetic assessment. The care plan should reflect the patient’s physical, psycho-social and cultural profile.
3. Select, prepare and organize all necessary anesthesia equipment and supplies.
4. Select and prepare the anesthetic agents and other appropriate pharmacological agents, in consultation with other members of the anesthesia care team.
5. Demonstrate the proper care and use of anesthesia equipment and supplies prior to use.
6. Safely and accurately, prepare all assigned patients for anesthesia and surgery.
7. Manage all aspects of the patient's anesthesia care, from the pre to the post-operative phase as determined by the student's clinical instructor.
8. Consistently demonstrate appropriate professional communication and interpersonal behavior.
9. Be certified in basic cardiac life support, advanced cardiac life support and pediatric cardiac life support.
10. Participate in planned simulation exercises, designed to demonstrate familiarity with the adult anesthesia reactions in various case scenarios, fiberoptic bronchoscopy, and the placement of peripherally inserted central catheters (PICC).
11. Demonstrate cultural competence when working with patients and members of the health care community.

NURSE ANESTHESIA CLINICAL PRACTICUM

NA771 – Clinical Practicum, Summer Semester
  2 credits (480 clock hours)
  Prerequisite: NA770.

NA772 – Clinical Practicum, Fall Semester
  2 credits (480 clock hours)
  Prerequisite: NA771.

NA773 – Clinical Practicum, Winter Semester
  3 credits (600 clock hours)
  Prerequisite: NA772.

NA774 – Clinical Practicum, Summer Semester
  3 credits (600 clock hours)
  Prerequisite: NA773.

Course Description
Clinical practicum provides the student with the opportunity to apply the principles of anesthesia to direct patient care. Students provide supervised care in a variety of settings. Students use advanced anesthetic techniques to challenge specialty rotations.
**Student Learning Objectives**

Upon completion of this course, the student is expected to be able to:

1. Conduct a thorough and accurate preoperative assessment on all assigned patients.
2. Derive a complete anesthetic care plan for all assigned patients using pertinent data gathered from the medical record and the patient interview.
3. Prepare and organize all pertinent anesthesia related equipment and pharmacologic agents.
4. Demonstrate proper care and use of all anesthesia related equipment.
5. Practice in a manner that is protective of self, the patient and the environment.
6. Safely and completely prepare all assigned patients for anesthesia and surgery.
7. Manage all aspects of the anesthetic care, from the preoperative area to the recovery area.
8. Demonstrate professional behavior and appropriate interpersonal skills while engaged in clinical practice.
9. Meet the individual site and specialty objectives.
10. Participate in planned simulation exercises, designed to demonstrate familiarity with the pediatric anesthesia reactions in various case scenarios, fiberoptic bronchoscopy, and the placement of peripherally inserted central catheters (PICC).
11. Demonstrate cultural competence when working with patients and members of the health care community.