NCE/SEE Content Outline

I. Basic Sciences (25%)
   A. Anatomy, physiology and pathophysiology
      1. Cardiovascular
         a. Ischemic heart disease
         b. Valvular heart disease
         c. Congenital heart defects
         d. Cardiac conduction and rhythm abnormalities
         e. Cardiovascular and peripheral vascular complications
         f. Infectious diseases
         g. Pericardial diseases
         h. Cardiomyopathy and heart failure
      2. Respiratory
         a. Obstructive diseases
         b. Restrictive diseases
         c. Infectious diseases
         d. Pulmonary vascular complications
         e. Altered airway anatomy
         f. Genetic respiratory disorders
      3. Central nervous system
         a. Neurodegenerative diseases
         b. Myelin diseases
         c. Cerebrovascular diseases
         d. Neuropathies and myopathies
         e. Psychiatric disorders
         f. Spinal cord disorders
         g. Intracranial tumor
         h. Congenital anomalies (e.g., cerebral palsy)
         i. Seizure disorders
         j. Genetic nervous system disorders
         k. Intracranial hypertension
         l. Thermoregulation
      4. Musculoskeletal
         a. Myopathies/metabolic complications

b. Neuromuscular diseases
c. Skeletal diseases
d . Musculoskeletal disorders
e. Genetic musculoskeletal disorders

5. Endocrine
   a. Thyroid and parathyroid disorders
   b. Pituitary disorders
   c. Adrenal disorders
   d. Pancreatic disorders
   e. Metabolic disorders
   f. Genetic endocrine disorders
6. Hepatic
   a. Infectious diseases
   b. Biliary tract and bilirubin disorders
   c. Cirrhotic disorders
   d. Hepatovascular complications
7. Renal
   a. Primary kidney diseases and disorders
   b. Acute kidney injury
   c. Chronic kidney injury
8. Hematologic
   a. Anemias
   b. Hemoglobin disorders
   c. Coagulation disorders
   d. Infectious diseases
9. Gastrointestinal
   a. Esophageal disorders
   b. Gastric disorders
   c. Pancreatic disorders
   d. Intestinal disorders
   e. Tumors/secreting lesions
   f. Malabsorption disorders
10. Immune
   a. Infectious disorders
   b. Hyper- and hypo-immune disorders (allergic response)
   c. Autoimmune diseases
11. Other conditions
   a. Cancer
   b. Glaucoma

c. Burns
d. Trauma
e. Substance abuse (alcohol, tobacco, other)

B. Pharmacology
1. General principles
a. Pharmacodynamics
b. Pharmacokinetics
c. Drug interactions
2. Inhalation anesthetics
3. Intravenous agents
a. Barbiturates
b. Sedative/hypnotics
c. Opioid agonists
d. Opioid agonist-antagonists
e. Opioid antagonists
f. Benzodiazepines
g. Benzodiazepine antagonists
4. Local anesthetics
5. Muscle paralytics
6. Anticholinesterase agents
7. Selective relaxant binding agents
8. Neuraxial analgesics
9. Anticholinergics/cholinergic agonists
10. Nonsteroidal antiinflammatory drugs
11. Miscellaneous analgesics
12. Sympathomimetics
13. Inotropes
14. PDE inhibitors
15. Digitalis and related drugs
16. Alpha- and beta-receptor antagonists
17. Antihypertensives
a. Sympatholytics
b. Centrally acting alpha2-adrenergic agonists
c. ACE inhibitors
d. Angiotensin II receptor inhibitors
e. Nitrovasodilators
f. Nitric oxide
18. Antidysrhythmics
19. Calcium channel blockers

20. Bronchodilators
21. Psychopharmacologic therapy
    a. Selective serotonin reuptake inhibitors
    b. Tricyclic antidepressants
    c. MAO inhibitors
    d. Lithium
22. Prostaglandins
23. Histamine receptor antagonists
24. Serotonin antagonists
25. Insulin
26. Oral hypoglycemic
27. Diuretics
28. Antacids
29. Gastrointestinal prokinetic medications (metoclopramide)
30. Anticoagulants
    a. Heparin and low-molecular-weight heparins
    b. Heparin reversal—protamine
    c. Antiplatelet medications
    d. Oral anticoagulants
    e. Oral anticoagulant reversal
    f. Thrombolytics
    g. Thrombin inhibitors
31. Antimicrobials
32. Chemotherapeutics
33. Antiepileptic drugs
34. Antiparkinsonian drugs
35. Lipid-lowering agents
36. Herbal remedies and dietary supplements
37. Minerals and electrolytes
38. Dantrolene
39. Corticosteroids
40. Tocolytics
41. Uterotonics
42. Antifibrinolytics
43. Intravenous dyes

C. Applied chemistry, biochemistry, physics
    1. Chemistry
        a. Aqueous solutions and concentrations
        b. Acids, bases, and salts
        c. Chemical reactions: oxidation, reduction, hydrolysis, and conjugation

2. Biochemistry
    a. Metabolism
    b. Cellular mechanisms for action
    c. Drug receptor interaction
3. Physics
    a. Units of measurement
    b. Gases and gas laws
    c. Solubility, diffusion and osmosis
    d. Pressure and fluid flow
    e. Electricity and electrical safety
    f. Vaporization and humidification
    g. Measurement of oxygen, carbon dioxide, and hydrogen ion

II. Equipment, Instrumentation and Technology (15%)

A. Anesthetic delivery systems
1. High/low pressure gas sources
2. Regulators/manifolds
3. Flowmeters, valves, floats
4. Vaporizers
5. Proportioning systems
6. Pressure failure safety devices
7. Fail-safe devices
8. Ventilator
9. Carbon dioxide absorbent
10. Anesthetic circuits
    a. Rebreathing, circle system
    b. Nonrebreathing
    c. Modified nonrebreathing
11. Pneumatic and electronic alarm devices

B. Airway equipment
1. Face masks
2. Laryngoscope
    a. Rigid
    b. Videoscope
    c. Optically enhanced scopes
3. Flexible fiberoptic bronchoscope
4. Endotracheal tube
5. Endobronchial tube
    a. Including double lumen tubes
6. Airways
    a. Oral

b. Nasal
7. Tracheostomy tubes
8. Supraglottic airways (i.e., LMA)
9. Intubating supraglottic airways
10. Jet ventilation
11. Intubating stylets
12. Lighted stylet
13. Cricothyrotomy (needle and surgical)
14. Other
    a. Eschmann catheter (i.e., "bougie")
    b. Combitube
    c. Exchange catheter

C. Monitoring devices
1. Central nervous system
    a. Evoked potential
    b. Intracranial pressure
    c. Modified EEG monitor (BIS, PSArray)
    d. Cerebral oximetry
2. Cardiovascular
    a. Electrocardiogram
    b. Arterial pressure monitoring
    c. Noninvasive blood pressure monitoring
    d. Central venous pressure monitoring
    e. Pulmonary artery pressure monitoring/ SvO_2
    f. Cardiac output
    g. Precordial/esophageal stethoscope/Doppler
3. Pulmonary/airway monitoring
    a. Capnography
    b. Airway gas analysis
    c. Pulse oximetry
    d. Airway pressure
    e. Blood gas analysis
4. Peripheral nerve stimulator
5. Urinary output monitoring
6. Temperature monitoring
7. Maternal/fetal monitoring issues
8. Others
    a. Fluid/blood warmers
    b. Forced air warming blanket
    c. Heat and moisture exchanger (HME)

d. Blood salvage (cell saver)

D. Imaging
   1. Ultrasound
   2. Fluoroscopy
   3. Radiography

III. General Principles of Anesthesia (30%)
   A. Ethical considerations
   B. Legal issues
   C. Safety and wellness
      1. Substance abuse (impairment, disorder, and other considerations)
      2. Issues surrounding patient safety
   D. Preoperative assessment and preparation of patient
   E. Fluid volume assessment and management
      1. Fluid/blood component therapy replacement
      2. Bloodless medicine (including cell saver and hemodilution techniques)
   F. Positioning
      1. Techniques
      2. Physiologic alterations
      3. Complications
   G. Utilization and interpretation of data
      1. Lab tests
      2. Diagnostic exams
      3. Intraoperative monitoring data
   H. Airway management
      1. Assessment
      2. Techniques, procedures, and devices
      3. Complications
      4. Difficult airway management
      5. Retrograde intubation
   I. Local/regional anesthetics (technique, physiologic alterations, complications)
      1. Anatomy
      2. Infiltration
      3. Topical
      4. Neuraxial blocks
      5. Peripheral blocks
      6. Other blocks (airway, retrobulbar)
      7. Ultrasound and/or nerve stimulator guided concepts and techniques
   J. Light, moderate, and deep sedation (monitored anesthesia care)
   K. Pain management
      1. Acute

2. Chronic (pathophysiology, techniques, management of patients)
    a. Pathophysiology
    b. Techniques
    c. Management of patients

L. Pain theory (anatomy, physiology, pathology, and psychodynamics)

M. Other techniques
1. Hypotensive
2. Enhanced recovery after surgery (ERAS)

N. Postanesthesia care/respiratory therapy

IV. Anesthesia for Surgical Procedures and Special Populations (30%)

A. Surgical and diagnostic anesthesia, including management of complications
1. Intraabdominal-laparoscopic versus open
    a. Hepatobiliary system
    b. Gastrointestinal tract procedures
    c. Endocrine organ procedures
    d. Renal/genitourinary
    e. Gynecologic procedures
    f. Peritoneal procedures (including hernia repair)
2. Extrathoracic
    a. Breast
    b. Plastics and/or reconstructive
3. Head
    a. Extracranial
        1) Otolaryngological
        2) Ophthalmologic
        3) Nasal
        4) Craniofacial
        5) Plastics and/or reconstructive
        6) Orthodontic/dental
    b. Intracranial
        1) Decompression (burr holes, ventriculoperitoneal shunt)
        2) Space-occupying lesion
        3) Vascular
        4) Transsphenoidal hypophysectomy
        5) Stereotactic procedures
4. Intrathoracic (including open and thoracoscopic approach)
    a. Diaphragm
    b. Endoscopic procedures (bronchoscopy, mediastinoscopy)
    c. Esophagus
    d. Heart

e. Lung
f. Mediastinal

5. Neck
   a. Larynx/trachea (including tracheostomy)
   b. Lymph node biopsies
   c. Parathyroid/thyroid
   d. Neck tumors
   e. Radical neck dissection
6. Neuroskeletal
   a. Cervical spine (anterior and posterior approach)
   b. Laminectomy/discectomy fusions at all levels
   c. Pain management procedures
   d. Spinal cord procedures
   e. Surgical sympathectomy
   f. Vertebroplasty
   g. Scoliosis repair
7. Orthopedic
   a. Arthroscopic procedures
   b. Closed reduction
   c. Fractures
   d. Total joint replacements/arthroplasty
   e. Procedures of the hand and foot
8. Perineal and pelvic procedures
   a. Gynecologic
   b. Genitourinary
   c. Anal/rectal
9. Vascular (open versus endovascular)
   a. Carotid
   b. Thoracic
   c. Abdominal (including renal)
   d. Extremity
      1) Occlusive disease
      2) Vascular access
      3) Vein stripping
   e. Thromboembolic prevention
   f. Surgical management of portal hypertension
10. Diagnostic/therapeutic
   a. Venous/arterial catheterization
   b. Interventional cardiology
      1) Cardioversion

2) Defibrillation (including AED)
3) Pacemakers
4) Automated internal cardiac defibrillator devices

c. Diagnostic imaging
d. Electroconvulsive therapy
e. Interventional radiology
f. Radiation therapy
g. Endoscopy

11. Other surgical procedures
    a. Trauma
    b. Burns
    c. Resuscitation
    d. Organ transplants (including management of posttransplant patient for nontransplant surgery)
    e. Organ procurement
    f. Laser procedures

B. Anesthesia for special populations
    1. Pediatrics
        a. Anatomy, physiology, and pathophysiology
            1) Normal
            2) Prematurity
            3) Congenital anomalies
        b. Pharmacology
        c. Anesthesia techniques/procedures
        d. Management of complications
    2. Obstetrics
        a. Anatomy, physiology, and pathophysiology
        b. Pharmacology
        c. Anesthesia techniques/procedures
        d. High-risk parturients
        e. Nonobstetric surgery in the parturient
        f. Management of complications
    3. Geriatrics
        a. Anatomy, physiology, and pathophysiology
        b. Pharmacology
        c. Anesthesia techniques/procedures
        d. Management of complications
    4. Obesity
        a. Anatomy, physiology, and pathophysiology
        b. Pharmacology

c. Anesthesia techniques/procedures (including bariatric)
d. Management of complications