IFOM®
International Foundations of Medicine

Basic Science Examination Content Outline

International Foundations of Medicine ®

National Board of Medical Examiners®

NBME®

Table of Contents

Physician Tasks/Competencies

Percentage Breakdown:

System	Range
Medical Knowledge/Foundational Science Concepts	62%–68%
Patient Care: Diagnosis	21%–28%
Patient Care: Management	6%–8%
Communication, Interpersonal Skills, & Professionalism	1%–3%
Practice-based Learning	2%–4%

Medical Knowledge/Scientific Concepts

Patient Care: Diagnosis

History and physical examination

Laboratory and diagnostic studies

Diagnosis

Prognosis/outcome

Patient Care: Management

Health maintenance and disease prevention

Pharmacotherapy

Clinical interventions

Communication, Interpersonal Skills, & Professionalism

Practice-based Learning

Application of principles of biostatistics

Population health

Epidemiology

Content Categories

Percentage Breakdown:

System	Range
General Principles of Foundational Science	12%–14%
Immune System	3%–5%
Blood and Lymphoreticular System	3%–5%
Nervous System and Special Senses	9%–11%
Skin and Subcutaneous Tissue	2%–4%
Musculoskeletal System	5%–7%
Cardiovascular System	11%–13%
Respiratory System	7%–9%
Gastrointestinal System	8%–10%
Renal and Urinary Systems	5%–7%
Pregnancy, Childbirth, and the Puerperium	2%–4%
Female Reproductive System & Breast	2%–4%
Male Reproductive System	1%–3%
Endocrine System	5%–7%
Multisystem Processes & Disorders	8%–10%
Biostatistics, Epidemiology, and Public/Population Health	2%–4%
Social Sciences	1%–3%

Organ System Processes	Range
Normal	20%–30%
Abnormal	70%–80%

General Principles of Foundational Science

Biochemistry and molecular biology

Gene expression: DNA structure, replication, exchange, and epigenetics

Gene expression: transcription

Gene expression: translation, post-translational processing, modifications, and disposition of proteins (degradation)

Structure and function of proteins and enzymes

Energy metabolism

Biology of cells

Adaptive cell responses and cellular homeostasis

Mechanisms of injury and necrosis, including pathologic processes

Apoptosis

Cell cycle and cell cycle regulation

Mechanisms of dysregulation

Cell/tissue structure, regulation, and function

Human Development and genetics

Principles of pedigree analysis

Population genetics: Hardy-Weinberg law, founder effects, mutation-selection equilibrium

Principles of gene therapy

Genetic testing and counseling

Genetic mechanisms

Biology of tissue response to disease

Acute inflammatory responses (patterns of response)

Chronic inflammatory responses

Reparative processes

Pharmacodynamic and pharmacokinetic processes

Pharmacokinetics: absorption, distribution, metabolism, excretion, dosage intervals

Mechanisms of drug action, structure-activity relationships

Concentration and dose-effect relationships, types of agonists, and antagonists and their actions

Individual factors altering pharmacokinetics and pharmacodynamics

Mechanisms of drug adverse effects, overdosage, toxicology

Mechanisms of drug interactions

Signal transduction, including structure/function of all components of signal transduction pathways such as receptors, ligands

Microbial biology

Microbial identification and classification

Bacteria

Viruses

Fungi

Parasites

Prions

Immune System

Normal Processes

Development of cells of the adaptive immune response

Structure, production, and function

Cellular basis of the immune response and immunologic mediators

Basis of immunologic protection

Effect of age on the function of components of the immune system

Abnormal Processes

Disorders associated with immunodeficiency

HIV/AIDS

Immunologically mediated disorders

Adverse effects of drugs on the immune system

Blood and Lymphoreticular System

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious and immunologic

Neoplasms

Anemia, cytopenias, and polycythemia

Coagulation disorders (hypocoagulable and hypercoagulable conditions)

Traumatic, mechanical, and vascular disorders

Adverse effects of drugs on the hematologic and lymphoreticular systems

Nervous System and Special Senses

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function, including neuronal cellular and molecular biology

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms (cerebral, spinal, and peripheral)

Cerebrovascular disease

Disorders relating to the spine, spinal cord, and spinal nerve roots

Cranial and peripheral nerve disorders

Neurologic pain syndromes

Degenerative disorders/amnestic syndromes

Global cerebral dysfunction

Neuromuscular disorders

Movement disorders

Metabolic disorders

Paroxysmal disorders

Sleep disorders

Traumatic and mechanical disorders and disorders of increase intracranial pressure

Congenital disorders

Adverse effects of drugs on the nervous system

Disorders of the eye and eyelid

Disorders of the ear

Skin and Subcutaneous Tissue

Normal Processes

Embryonic development, fetal maturation, and neonatal changes

Organ structure and function, including barrier function, thermal regulation

Cell/tissue structure and function, eccrine function

Repair, regeneration, and changes associated with stage of life

Skin defense mechanisms and normal flora

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms

Adnexal disorders (hair and hair follicles, nails, sweat glands, sebaceous glands, oral mucous membranes)

Oral disease

Disorders of pigmentation

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on skin and subcutaneous tissue

Musculoskeletal System

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious, inflammatory, and immunologic disorders

Neoplasms

Degenerative and metabolic disorders

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on the musculoskeletal system

Cardiovascular System

Normal Processes

Embryonic development, fetal maturation, and perinatal transitional changes

Organ structure and function

Cell/tissue structure and function

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms

Dysrhythmias

Heart failure

Ischemic heart disease

Diseases of the myocardium

Disease of the pericardium

Valvular heart disease

Hypotension

Hypertension

Dyslipidemia

Vascular disorders

Traumatic and mechanical disorders

Congenital disorders, including disease in adults

Adverse effects of drugs on the cardiovascular system

Respiratory System

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function, including surfactant formation, and alveolar structure

Repair, regeneration, and changes associated with stage of life

Pulmonary defense mechanisms and normal flora

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms

Obstructive airway disease

Pneumoconiosis/fibrosing/restrictive pulmonary disorders/interstitial lung disease

Respiratory failure/respiratory arrest and pulmonary vascular disorders

Metabolic, regulatory, and structural disorders

Disorders of the pleura, mediastinum, and chest wall

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on the respiratory system

Gastrointestinal System

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function

Repair, regeneration, and changes associated with stage of life

Gastrointestinal defense mechanisms and normal flora

Abnormal Processes

Infectious, immunological, and inflammatory disorders

Neoplasms

Signs, symptoms, and ill-defined disorders

Disorders of the oral cavity, salivary glands, and esophagus

Disorders of the stomach, small intestine, colon, rectum, and anus

Disorders of the liver and biliary system, noninfectious

Disorders of the pancreas

Disorders of the peritoneal cavity

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on the gastrointestinal system

Renal and Urinary Systems

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms

Signs, symptoms, and ill-defined disorders

Metabolic and regulatory disorders

Vascular disorders

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on the renal and urinary system

Pregnancy, Childbirth, and the Puerperium

Normal Processes

Organ structure and function: pregnancy

Abnormal Processes

Prenatal care

Obstetric complications

Labor and delivery

Puerperium, including complications

Newborn (birth to 4 weeks of age)

Congenital disorders, neonatal

Adverse effects of drugs on pregnancy, childbirth, and the puerperium

Systemic disorders affecting pregnancy, labor and delivery, and puerperium

Female Reproductive System & Breast

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function

Reproductive system defense mechanisms and normal flora

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms of the breast, cervix, ovary, uterus, vagina, and vulva

Fertility and infertility

Menopause

Menstrual and endocrine disorders

Sexual dysfunction

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on the female reproductive system and breast

Male Reproductive System

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue structure and function

Reproductive system defense mechanisms and normal flora

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms

Metabolic and regulatory disorders, including sexual dysfunction

Traumatic and mechanical disorders

Congenital disorders

Adverse effects of drugs on the male reproductive system

Endocrine System

Normal Processes

Embryonic development, fetal maturation, and perinatal changes

Organ structure and function

Cell/tissue/structure and function

Repair, regeneration, and changes associated with stage of life

Abnormal Processes

Diabetes mellitus and other disorders of the endocrine pancreas

Thyroid disorders

Parathyroid disorders

Adrenal disorders

Pituitary disorders

Hypothalamic endocrine disorders

Multiple endocrine neoplasia (MEN1, MEN2)

Congenital disorders

Adverse effects of drugs on the endocrine system

Multisystem Processes & Disorders

Normal Processes

Principles of nutrition

Electrolyte and water metabolisms

Intracellular accumulations

Abnormal Processes

Infectious, immunologic, and inflammatory disorders

Neoplasms and related disorders

Signs, symptoms, and ill-defined disorders

Nutrition

Toxins and environmental extremes

Venomous bites and stings

Fluid, electrolyte, and acid-base balance disorders

Abuse

Multiple trauma (e.g., prioritization, blast injury)

Shock, cardiogenic, hypovolemic, neurogenic, septic; sepsis, bacteremia, systemic inflammatory response syndrome (SIRS), refractory, multiorgan dysfunction syndrome

Genetic metabolic and developmental disorders

Adverse effects of drugs on multisystem disorders

Biostatistics, Epidemiology/Population Health, and Interpretation of the Medical Literature

Epidemiology and public/population health

Study design, types and selection of studies

Measures of association (e.g., relative risk, odds ratio, other)

Distributions of data (e.g., normal distribution, regression to mean)

Correlation and regression, uses and interpretation

Principles of testing and screening (e.g., sensitivity and specificity, predictive value, probability)

Study interpretation (e.g., causation, validity, statistical vs. clinical significance)

Social Sciences

Communication and interpersonal skills, including patient interviewing, consultation, and interactions with the family (patient-centered communication skills)

Medical ethics and jurisprudence

Consent to treatment/decision-making capacity

Death and dying and palliative care

Physician-patient relationship

Professional conduct/integrity