Building Working Cells and Tissues (BWCT)
85 course hours
Updated August 2016

BWCT is an integrated course occurring in early fall of FOM1 that applies key principles of biochemistry, histology and physiology to promote an understanding of how cells and tissues are built, how they function and how malfunction can lead to disease. This basic knowledge provides the foundation for understanding organ structure, physiology and disease states that are covered in subsequent courses, during clinical rotations and in clinical practice. Basic science concepts are reinforced throughout the course with problem solving and clinical case discussions using both whole-class and small-group formats. Substantial connections exist between BWCT and the concurrent Principles of Human Genetics course, as many metabolic diseases have a genetic origin. In addition, some of the clinical discussions are carried out jointly between BWCT and DCS (Doctoring and Clinical Skills). The course includes large and small group sessions, integrated case discussion and virtual microscopy.

Key course concepts include:

- Structure and function of biological macromolecules and how inherited mutations can alter a protein's ability to function
- Fundamental principles in metabolic processes and how these go awry in diseases such as diabetes
- Structure and function of cell organelles, including membrane proteins that are targets for many drugs
- Generation and function of cellular electrical potential and action potential
- Structure and function of epithelial, connective, muscle and neuronal tissues

Student competency is assessed primarily through quizzes, exams and participation in case discussions.

Principles of Human Genetics (PoGH)
40 course hours
Updated June 2016

Human Genetics underlies almost every aspect of human health, and recent advances in human genome sciences makes knowledge of this fast-paced field imperative for future clinicians and researchers in fields that impact health. This course focuses on human and clinically relevant genetics with emphasis on the basic underlying scientific mechanisms and concepts, including recent advances in epigenetic regulation of the genome and stem cell therapy. We will cover chromosomal, single gene, multifactorial and non-mendelian inheritance as well as human cancer genetics and human genomics with links to the newest area of epigenomics. Problem solving will involve clinical, molecular and quantitative data. We hope to provide a framework for understanding a fast growing and highly technical field and an appreciation of how current genomics research impacts most aspects of medicine, biomedical research, and public health policy.

Key objectives:

- Introduce basic concepts and knowledge of clinically-relevant human genetics
- Learn key vocabulary and problem solving skills
- Acquire an in-depth, informed appreciation of the pervasiveness of human genetics throughout medicine
- Gain awareness and sensitivity to ethical legal social issues
- Demonstrate competence in understanding genetic literature and gain motivation to continually further independent education of human genetics

Evaluations will test not only knowledge base, but problem solving skills and the ability to seek and analyze appropriate information.

Determinants of Health (DOH)
30 course hours
Updated June 2016

The Determinants of Health course lays the foundation for students to consider the ways in which the external environment affects and influences human beings' health. Implemented across both semesters of the FOM1 and fall FOM2 semester, DOH combines didactic, classroom based lecture and small group discussion in the first year with the Population Health Clerkship (PHC) in the second. Through the first year's Epidemiology and Biostatistics segment, students work in an interprofessional setting with colleagues from our Graduate School of Nursing to study fundamentals and learn to assess the medical literature. In the fall of the second year, the PHC provides an intensive, two-week hands-on interprofessional small group immersion learning experience for medical and graduate school of nursing students. Student and DOH course leaders build on this foundation to work actively with faculty from other courses to effectively integrate DOH concepts into courses throughout the curriculum.

Selected key objectives include:

- Develop a fundamental understanding of the determinants of health, including the many complex and interrelated factors associated with the health of individuals and populations.
- Understand the relationships among community, cultures, the medical care systems, and the health of individuals and populations.
- Understand the role of biostatistical and epidemiological principles in: (1) clinical diagnosis and treatment; (2) population health; and (3) evaluating outcomes of health care services.
- Understand and demonstrate the clinician's role as advocate for the health of individuals and populations.
- Understand and demonstrate the clinician's role as one member of the inter-professional health care team functioning within a community.

The course uses narrative feedback on first year students' reflective essays as well as formative and summative assessments of epidemiology and biostatistics problem sets and exams. In the second year's PHC, students complete reflective essays and an academic poster to present insights gained through the clerkship, and receive feedback on a range of characteristics to support ongoing professional development.

Integrated Case Exercises (ICE)
15 course hours
Updated June 2016

The Integrated Case Exercises (ICE) curriculum aims to link the student's core learning through Foundations of Medicine (FOM) 1 and 2 to clinical problems that real patients face every day. The ICE curriculum in the first year of medical training (ICE-1) cross-links material from other FOM-1 courses, and applies it practically in a clinical case setting. The ICE curriculum in the second year of medical training (ICE-2) is geared toward preparing the second year student for competency on the wards and clinics in their following two years of training, while cross-linking material between courses in the FOM-1/FOM-2 curricula.

There are 18 one-hour ICE sessions in the first year curriculum and an additional 12 in the second year. The topics covered are intentionally very broad. The goal is to treat a variety of subjects that display the interconnections of the basic medical sciences, clinical medicine and the humanistic side of practicing medicine. In both ICE-1 and ICE-2, we draw on the knowledge of experts in relevant fields of medicine whenever possible. Particularly in ICE-2 we review many practical technical skills that a student might find themselves doing in the subsequent two years (e.g. reading an ECG, applying oxygen to a patient, calling a consultant, etc.) ICE utilizes interactive large group learning, incorporating technology and simulation to support faculty engagement from off-site and student learning.

Selected key concepts or objectives include:

- Reinforcement of the foundational basic sciences with application to clinical problem solving
- Considering unique patient populations, impact of disease and social determinants of health
- Active engagement in the processes of clinical care including real-time decision-making and consultation

Student performance assessment in ICE includes online assessments associated with each case, as well as participation in a Formative Assessment that is given each year.

Foundations of Health and Disease (FHD) is a component of the bridge curriculum, comprising the end of the first academic year of medical school. The content and approach are designed to serve as a transition between FOM1 and FOM2. Through FHD, students will begin to apply principles developed in prior FOM1 courses to content areas that underscore many of the normal and dysregulated homeostatic mechanisms learned in FOM2. Content is integrated across several disciplines, primarily including pathobiology (the study of disease mechanisms), pathophysiology (the study of disease manifestations), and medical pharmacology (the contextual study of drug mechanisms), but with strong ties to epidemiology, anatomy, physiology, immunology, and neoplasia.

Development Structure and Function (DSF)
290 course hours
Updated June 2016

DSF integrates gross and clinical anatomy, physiology, histology and development into a 260-hour, 5-month course beginning in the third month of year one. DSF integrates regional and systemic aspects of human structure with physiological function. Thorax anatomy is linked with cardiovascular and respiratory functions. Abdominal and pelvic structure are integrated with gastrointestinal, renal and reproductive functions. Head/neck anatomy are integrated with pituitary-regulated endocrine systems. Musculoskeletal anatomy is linked to bone and growth physiology. About half of DSF is lecture-based, combining major concepts in physiology, anatomy, histology and development with clinical imaging illustrations. The remainder utilizes gross and virtual microscopy laboratories, physiology problem-solving sessions, and audience response feedback. Simulation engages students in experiential learning; students use Anatomage virtual dissection to investigate regional anatomy of clinical cases, perform ultrasound of the same region on standardized patients, and manage high-fidelity mannequin case scenarios related to the regional anatomy.

Selected key concepts or objectives include:

- Discuss early embryologic development from gamete formation through early development and summarize normal continuous changes in structure and function of organs that occur throughout an individual's lifespan, using this information to predict how an abnormality at one stage of development causes postnatal disorders.

- Structure: Use team-based cadaveric dissection, prosections, virtual microscopic images and clinical images to dissect and identify basic cell, tissue and organ structures; describe relationships between the physiology of different organ systems and their underlying gross and microscopic structures; relate 3-D structural relationships at tissue/organ levels to gross specimens, radiological images, and human surface anatomy.

- Function: Describe normal physiology of each major organ system and interactions among organ systems at a whole organism level; demonstrate an understanding of normal homeostatic processes that depend on communication and feedback at the cellular, organ, and systemic levels and use clinical data to predict responses and adaptations to changing internal demands or to normal or abnormal external stresses.

Summative assessments comprise 70% of the grade. Exams combine multiple-choice questions with performance-based assessments that use laboratory specimens and images. The remainder of the grade derives from timely completion of assignments, active participation in laboratory and conference sessions, and performance on low-stakes online quizzes.

Doctoring and Clinical Skills (DCS)
120 course hours
Updated June 2016

The **Doctoring and Clinical Skills** (DCS) course is the major curricular component of Learning Communities. DCS spans the first two years of medical school and teaches students the fundamental clinical skills of the medical interview and clinical communication, physical examination, clinical problem solving, professionalism and medical ethics, while attending to core issues of our students professional identity formation as student-physicians. The DCS course also provides clinical reinforcement of basic biomedical, social determinants of health and quantitative health sciences curricular content. Much of this content is taught in small groups consisting of students and their House Mentor or other key faculty. By teaching their students in the DCS course and in other curriculum over portions of the first 3 years, House Mentors observe their students in action over time and monitor their development of competencies.

DCS has three main components: 1) **small group sessions**, in which students meet regularly with two faculty facilitators (one MD and one non-physician) to learn and practice skills in core competencies including the medical interview, clinical reasoning, teamwork and presentation skills; this component includes extensive experience with Standardized Patients and a "Clinical Observation" that links students with interprofessional colleagues in ambulatory and inpatient settings throughout the Health Care system; this component is led by LC mentors in FOM2; 2) **Physical Diagnosis** (PD) in which students work with their LC mentors and Advanced Studies peer teachers to acquire the mechanical skill of the physical examination and focus on their efficient and respectful execution; in FOM2 these occur as 'hospital sessions' and students work with their LC mentor to integrate skills and perform full histories, physical examinations, oral presentation and write ups for hospitalized patients; 3) the **Longitudinal Preceptorship Program** (LPP) which places students a consistent clinical setting beginning in the first weeks of medical school, providing the opportunity to practice skills taught in small group or PD and to interact with patients under the supervision of an assigned faculty physician preceptor in diverse preceptorship sites including urban, rural and underserved, hospital and community settings.

Selected key concepts or objectives include

- Preparing first and second year students for clinical work of the third and fourth years and their future professional practice;
- Building a practice of patient-centered care including incorporating social and societal determinants of health, teamwork, health care systems and their technologies, motivational interviewing and behavioral change models, caring for underserved populations and promoting quality & safety into their interactions
- Experiential reflection, personal and professional development
- Integrating learning across courses to build skill in the art and science of medicine

Student assessment includes participation in all components, completion of reflective assignments and patient write-ups, standardized patient interactions.

Pharmacology (POP)
30 course hours
Updated September 2016

The Principles of Pharmacology course introduces and applies basic concepts of pharmacology and toxicology. By emphasizing general principles, the PoP course provides an intellectual framework for students to apply in the interpretation and organization of all drug information introduced in subsequent courses. Students complete CITI training to learn the principles of human subjects research as part of the course.

The course is divided into two blocks. Block 1 topics include pharmacodynamics, pharmacokinetics and drug metabolism. This section of the course will cover drug development, general principles of drug action, basic aspects of drug metabolism and considerations for drug dosing. Block 2 includes toxicology and drugs affecting the autonomic nervous system. The PoP course links closely to students' premedical training in general and organic chemistry and builds on material from prior medical school courses such as Building Working Cells and Tissues, and Development, Structure and Function.

Selected key concepts or objectives include:

- Demonstrate an understanding of the processes involved in drug discovery, development, marketing approval, marketing practices and their influence on prescribing.
- Demonstrate an understanding of the general principles of pharmacodynamics and pharmacokinetics, describing the effects of drugs interacting with their receptors and describing how the drug is absorbed, distributed, metabolized, and eliminated from the body.
- Calculate pharmacokinetic parameters of a drug based upon route of administration, frequency of dosing, size of dose etc.
- Demonstrate an understanding of the function of peripheral neuroeffector systems, neurotransmitters and receptor subtypes involved, and the similarities and differences between the major neuroeffector systems.
- Demonstrate an ability to predict both the direct responses to administration of drugs that activate or inhibit each of the major peripheral neuroeffector systems and the resulting reflex changes in physiologic function.

POP is assessed using a series of online and in-class quizzes and exams that allow students to demonstrate understanding of knowledge and principles through problem-solving exercises.

Infections (INF)
65 course hours
Updated September 2016

Under review

Host Defense and Blood (HDB)
70 course hours
Updated June 2016

Host Defense and Blood (HDB) provides an integrated overview of blood and its disorders (hematology), immunology and inflammation. It incorporates several features including on-line learning modules, clinical case discussions and problem-solving sessions. Our specific focus is on building student knowledge of the interactions between the blood, immune and inflammatory systems and using this information in conjunction with clinical data to identify important hematological and immunological disorders. Core competencies include physician as Scientist and Clinical Problem Solver.

Selected key concepts and objectives include:

- Development of blood cells, hematopoietic failure, related syndromes and treatment
- Elements of innate and adaptive immunity
- Relationship of immune mechanisms to pathologic states
- Transfusion and transplantation therapies
- Mechanisms of hemostasis including related pathologic states and pharmacologic interventions

Assessment is based on small group participation, quizzes and exams.

Cancer (CA)
25 course hours
Updated August 2016

Cancer Concepts (CA) is a component of the UMMS bridge curriculum occurring at the end of the FOM1 academic year. The content and approach in the bridge curriculum are designed to serve as a transition between FOM1 and FOM2.

Through CA, students combine basic principles from FOM1 courses with cancer concepts into applied cancer care in preparation for FOM2. Content is integrated across several disciplines. Material is presented in the context of clinical medicine, incorporating diagnostic imaging, radiation oncology, surgical oncology, medical oncology, presenting signs and symptoms, oncologic emergencies, paraneoplastic syndromes, societal implications, prevention, and screening. Special attention is placed on weaving the Cancer Concepts into specific clinical cases to prepare the student for the Organ System Disease course and the clinical years. **Teaching methods are based on case-based instructional learning based on lecture, independent learning and small group discussion, in which students take the responsibility to lead topic-focused sessions.**

Key course objectives or concepts include:

- Basic pathophysiology of malignancy, carcinogenesis, tumor cell biology, angiogenesis, tissue invasion and metastasis
- Anti-cancer pharmacology, radiation oncology, surgical oncology, pediatric oncology, epidemiology, clinical presentation of and screening for cancer

Student competency is assessed by small group participation and **summative assessments (quizzes, exam, assignments).**

Foundations of Health & Disease (FHD)
30 course hours
Updated June 2016

FHD can be thought of two tightly woven compartments: Nutrition / Metabolism and Vascular Health and Disease. Multi-system diseases explored in these components demonstrate homeostasis its disruption using specific diseases that focus on nutritional components — such as diabetes mellitus, obesity, and vitamin deficiencies — and blood vessels — such as hypertension and atherosclerosis. Exemplars are discussed in depth, with attention to etiologic mechanisms, clinical perspectives, and population-level considerations, and preview principles of pathophysiology and disease that are explored in depth throughout all systems in the FOM2 Organ System Diseases and Brain courses. The course is also tightly coordinated with Cancer Concepts and Determinants of Health which overlap in time.

Selective Key concepts and Objectives:

The following are the major course objectives for FHD. Through the varied sessions in the course and individual session objectives, multiple UMMS competencies for medical education will be met, including physician as scientist, clinical problem solver, patient and community advocate, and communicator.

- Explore the metabolic pathways that govern nutritional homeostasis and the pathobiologic mechanisms underscoring pervasive diseases such as obesity, diabetes across the lifespan.
- understand fundamental mechanisms in pathologic processes involving aberrant vascular flow, and how do these disorders lead to downstream tissue and end-organ damage including diseases such as atherosclerosis, and hypertension.
- Consider the major drug classes involved in regulating nutritional and metabolic homeostasis and vascular health.
- Develop basic understanding of nutritional requirements and principles including vitamin deficiencies and their clinical manifestations
- Discuss the social determinants of vascular and nutritional health, and strategies for limiting disease and disease effects in individuals and populations.

FHD is assessed through a series of individual and group exercises, quizzes and examinations that all students to demonstrate knowledge, application and problem-solving.