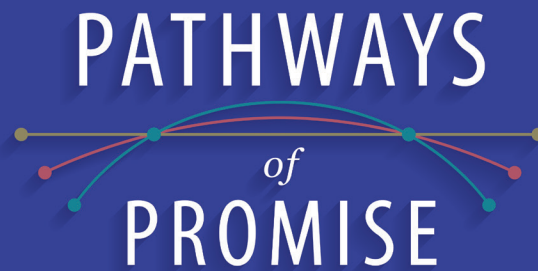


# PATHWAYS *of* PROMISE



THE CAMPAIGN FOR  
UMASS MEDICAL SCHOOL

## Educating the Scientists, Nurses and Physicians of the 21st Century

UMass Medical School—Massachusetts' only public health sciences university and one of the world's best academic health sciences centers—is training the leaders of science, nursing and medicine for the commonwealth and the world through its three graduate schools: the School of Medicine, the Graduate School of Biomedical Sciences and the Graduate School of Nursing.

Our strategic goal in education is: As a highly innovative, interprofessional community of students and educators, we will build a health care delivery and biomedical research workforce that makes a lasting impact on human and community health. Within this are three operational imperatives:

- Expand the collaborative learning experience to advanced, patient-centered practice and research through interprofessional, team-based learning.
- Implement innovative, self-directed and experiential learning using evidence-based methods and technologies
- Evaluate and optimize the number of learners along the continuum within our three schools, and across the commonwealth and beyond.

**Examples of opportunities** that support these goals are provided in the following pages.

### Theme 1: Expanding Interprofessional Education (IPE)

The advent of interprofessional, team-based practice in health care is based on evidence that rates of medical errors are alarmingly high when compared with other critical performance industries, such as commercial air travel or banking. Institute of Medicine (IOM) reports have documented the need for team-based approaches to interprofessional communication and multidisciplinary care teams. Also, the elimination of historical barriers between scientific disciplines inside and outside of biomedical research is enabling scientific progress that was previously unimagined. The challenge for health sciences and biomedical research educators is to continue teaching the fundamentals while working to reduce barriers to scientific and clinical collaboration. UMMS has received national recognition as a leader in IPE, and seeks to advance team-based approaches to teaching, practice and scientific investigation, which will more fully prepare our students to take on these new opportunities.

**Examples of specific opportunities** to foster interprofessional learning include:

- > **Team-based, global health experiences** that bring together medical students, graduate nursing students, graduate biomedical sciences students and other health professionals to deliver innovative community-based care, such as the UMMS initiative to deliver care to indigent farm workers in the Dominican Republic.
- > **An interprofessional education grant (IPEG) program** to seed innovative new ideas in IPE created by teams of faculty from two or more of our graduate schools.
- > **A unique immersive opioid-conscious curriculum** taught by interprofessional teams of physicians, nurses and pharmacists to interprofessional teams of learners from all three of our graduate schools.

UMass Medical School's **unique or distinguishing characteristics** in this area include:

- The **only** public health sciences and biomedical research university in the Commonwealth of Massachusetts
- A unique, interdisciplinary community of biomedical science PhD students, medical students, graduate nursing students, medical residents and fellows.
- One of a few dozen NIH-funded MD-PhD programs in the U.S., highlighting the interprofessional nature of physician-scientist training in solving real-world problems through patient-centered research.
- Future-oriented leadership committed to prioritizing patient outcomes when defining the scope of practice of various health care providers (as opposed to tradition hierarchies and silos).
- A history of innovation in interprofessional studies, including the Population Health Clerkship, where medical and nursing students work together in the community, and the opioid-conscious curriculum.

## **Theme 2: Fostering Active and Experiential Learning**

UMass Medical School educators base curricula and teaching methods on advanced learning theory and an improved understanding of how today's health sciences and biomedical research students acquire, retain, recall and analyze information. The fundamentals are (1) that optimal learning is student-directed, active and based on multi-sensory, multi-modal experiences, and (2) that most skills required by physicians, nurses and biomedical scientists are based on effective communication and critical decision making. The overarching structures of our curricula are competency-based: they define the desired outcome in terms of the attributes that professionals must acquire during training.

**Examples of opportunities** to foster experiential learning include:

- > **Problem-based learning curricula for PhD students in basic biomedical sciences.**  
With abundant genomic information now available in basic biology, biomedical scientists need to develop skills as self-directed and lifelong learners, developing techniques of thinking that are in line with the scientific method. [See Appendix 1]
- > **The Opioid Safe prescribing Training Immersion (OSTI)** course—an intense four-part curriculum taught by and to interprofessional teams to enable learners to develop basic competencies in diagnosing and treating pain, while trying to prevent, detect and safely manage opioid substance use disorders.
- > **Integrated virtual anatomy** from the subcellular, microscopic level to the whole human body, utilizing advanced imaging and software visualization tools such as the Anatomage virtual anatomy table, microcopy and traditional dissection. This enables students to master a functional and structural understanding of human anatomy as it may be encountered in the clinic, the CT or MRI scanner, or the operating room.
- > **Game-based immersive learning**,—an innovative approach to learning that combines aspects of simulation and virtual reality with game playing in a manner that enables students to experience critical decision-making scenarios in a virtual environment. Such approaches take advantage of modern, young adult learners' familiarity with and enthusiasm for the video game format, which is designed to maintain users' engagement to "keep playing."

UMass Medical School's **unique or distinguishing characteristics** in this area include:

- An outstanding, highly collaborative and integrated faculty, including physicians, scientists, physician-scientists, nurses and nurse-scientists, who work together to optimize outcomes for students and the patients they will one day serve.
- The state-of-the-art interprofessional Center for Experiential Learning and Simulation (iCELS), which includes—in one facility—standardized patient (patient-actor) programs; mannequin-based, high-fidelity simulators and task trainers; a surgical skills lab with the full scope of simulated endoscopy, bronchoscopy, laparoscopy and robotic surgery instruments; and a simulated nursing environment structured like the floor of a modern academic hospital.

### **Theme 3: Optimizing the number and type of health sciences and biomedical research learners**

The aging baby-boom generation and the rapidly shifting patterns of health care providers' working environments are creating a demand for health sciences universities to adapt rapidly to changing needs in the health care workforce in Massachusetts and around the world. UMass Medical School seeks to respond to those demands by critically assessing and modifying the size and scope of our academic enterprise. The need to increase the number of primary care physicians and nurse practitioners is an overriding theme, made more urgent by changes in reimbursement ushered in under health insurance reform and the Affordable Care Act. Also, due to changing demographics, there is a need for a more diversified provider workforce.

**Examples of opportunities** to enable the UMMS effort to assess and optimize learners include:

- > **Comprehensive and effective pipeline pathways** (spanning elementary, secondary and undergraduate schools) for economically and educationally disadvantaged and underrepresented students. UMMS has a 25-year history of supporting pipeline programs that work with all three of our graduate schools, including the innovative Baccalaureate-MD Pathway and the Pathways to Graduate Study Program (PGSP), which are effectively preparing students for entry into the School of Medicine and Graduate School of Biomedical Sciences, respectively. In addition, the Graduate School of Nursing hosts a Nursing Expo to attract and retain underrepresented graduate nursing students.
- > **MD program expansion** led by the Population-based Urban and Rural Community Health program—a dedicated curriculum for primary care physicians based at our regional campus in Springfield (UMMS-Baystate Health).
- > A **longitudinally integrated clerkship (LIC)**—an innovative part of the Population-based Urban and Rural Community Health program in which students participate in the care of assigned patients over extended periods of time, establishing a continuity based care model that replicates medical practice in the real world setting. [See Appendix 2]
- > An innovative program for biomedical scientists in professional development for careers within academia and beyond, with a special focus on potential for productive careers in industry.

UMass Medical School's **unique or distinguishing characteristics** in this area include:

- Leaders and faculty in each of our three graduates schools who have expertise in pipeline and professional development.
- Active education and service relationships with health care and service agencies in all regions of the commonwealth, from Cape Cod to the Berkshires, with special relationships to the Worcester and Springfield communities and schools.
- Strong partnerships with the other University of Massachusetts campuses.
- One of a handful of institutions with NIH-funded training programs in all of the areas described above: pipelines for underrepresented students, biomedical scientist professional development and physician-scientist training.

## **APPENDIX 1**

### **GSBS Foundations Curriculum**

As scientific knowledge expands, it becomes impossible to “teach” all essential information. Scientists must become skilled in continuous learning, extracting and organizing knowledge from the primary literature; identifying true knowledge gaps; devising strategies to find and create new information; integrating new knowledge into existing frameworks; and articulating their work. These skills are fundamental in the sciences as well as in all careers where problem-solving is paramount.

The faculty of the Graduate School of Biomedical Sciences (GSBS) at UMass Medical School have designed and implemented a far-reaching program of doctoral research education called “Foundations” to address these challenges. Each phase of GSBS graduate education—introductory, core and advanced curricula, research training, preparation for candidacy, thesis research, career planning and thesis defense—teaches fundamental skills through instruction based in problem-solving to prepare trainees for the real-life challenges of research in the biomedical sciences and beyond.

The Foundations program is built on 40 years of teaching and research experience. In designing it, the GSBS faculty explicitly recognize that the practice of research and research training differ significantly from established classroom approaches to research education. The GSBS faculty also acknowledge that our trainees must be ready for diverse careers that require problem solving and communication skills. The result is a transformative research education experience based on problem-solving; inter- and trans-disciplinary approaches to biomedical research that strongly emphasize the scientific method; quantitative approaches to science; the development of strong communication skills and self- and team-directed approaches to learning; research; and professional development.

## **APPENDIX 2**

### **Longitudinal Integrated Curriculum**

#### **Background introduction**

With the establishment of the new regional campus in Springfield, Mass.—UMMS-Baystate Health—our institution has a special opportunity to add to its academic portfolio of excellence and innovation with a unique and exciting educational program for our medical students: a **longitudinally integrated clerkship (LIC)**. This clerkship is fully aligned with our School of Medicine founding mission of excellence and innovation in medical education and our focus on primacy care and the needs of the commonwealth's underserved communities. The establishment of an LIC will further enhance the distinction of our academic program for which UMMS has been nationally recognized and rated in the top 90th percentiles for student satisfaction and practice in primary care.

#### **What is an LIC?**

An LIC is a well-established and well-researched model of clinical education in which students participate in the care of their assigned patients over extended periods of time, establishing a continuity based care model that replicates medical practice in the real world setting. In contrast to the “traditional” model of clinical training in which students are assigned to core specialty rotations at diverse sites for defined “blocks” of time (typically four to six weeks in duration), an LIC experience places a student in one hospital in one community, allowing the student to follow patients rather than a clerkship schedule. This LIC patient-centered model enriches the student's learning experience by enabling them to get to know their patients, establish enduring relationships with them for up to a year or more, provide comprehensive care to them and their families and experience an “authentic” patient-centered relationship that mirrors the experience of physician practice.

#### **What are the benefits and limitations of an LIC?**

LIC experiences have fostered professional values, enhanced student perceptions and satisfaction with their education. They have also promoted essential attributes of humanism, altruism and caring attitudes, as well as important skills in interprofessional collaborative practice, patient safety and quality, and commitment to caring for patients in underserved settings such as rural and remote communities and in under-subscribed specialties such as family medicine and the primary care. Participating faculty, hospitals, office practices and their patients and communities also benefit from an LIC, with high satisfaction ratings and outcomes that include retention of students into residency programs and practices, and serving the identified needs of LIC communities and their patients.

The limitations of an LIC model are largely operational, requiring the appropriate site to support the LIC requirement for numbers and types of patients, as well as the infrastructure costs and the support resources required to establish and maintain the program. Once established, LICs have added operational efficiencies to educational programs and reduced the administrative burden of cyclical site placement.

#### **What can an LIC can offer UMMS?**

The compelling “return on investment” for an LIC has promoted the establishment of increasing numbers of these programs in medical schools nationwide, with diverse models designed to meet schools' individual needs. Reasons for establishing an LIC at UMMS include:

- Benefits for patients and communities in rural and urban underserved areas of Massachusetts.
- Addresses physician workforce needs of these communities by promoting recruitment and retention in the primary care disciplines, notably family medicine, general internal medicine and pediatrics.
- Develops important values, skills and attitudes consistent with UMMS' educational objectives and six competencies, including active, self-directed learning; humanism; professionalism; and health system issues (quality, safety and interprofessional collaborative practice)
- Further advances UMMS' reputation for excellence and innovation in medical education and student satisfaction

#### **References**

O'Brien et al, 2012; Hauer et al, 2012; Konkin/Suddards, 2012; Teherani et al, 2009; Ogur et al, 2007; Ogur & Hirsh, 2009; Hirsh et al, 2012; Gaufberg et al, 2014; Teherani et al, 2009; Walters 2008; Poncelet et al, 2013; Poncelet et al, 2014; Worley 2003; Hudson 2012; Hansen & Simanton, 2012; Woloschuk et al, 2014; Hudson, Knight, & Weston, 2012; Walters et al, 2012; Myhre, Woloschuk, & Pedersen, 2013; Worley P. 2008; Zink et al, 2010; Stagg et al, 2012; Norris, 2009.

## APPENDIX 3

### **UMass Medical School Learning Innovation Lab: Creating master learners for the biomedical workforce of the future**

As stated in Theme 2, UMass Medical School educators are committed to creating and implementing curriculum that supports an academic experience founded on the principles of advanced learning theory and state-of-the-art teaching technologies. To become the biomedical workforce of the future, today's learners must go beyond acquiring knowledge: they must also think critically, work collaboratively, maintain a robust curiosity and perform skillfully, while adapting to the exponential growth of knowledge in the biomedical and health care sciences. Simply put, our new generation of students must become "master learners," adopting a practice of lifelong learning and acclimating themselves to the rapidly evolving environment in biomedical and health systems sciences, where change is ubiquitous and adapting to it is essential to succeed and thrive.

These learners also represent a digitally savvy generation—individuals who have been immersed in online and virtual reality environments, mobile systems and game-based technologies, which are now becoming educational platforms.

We envision the UMMS Innovation Lab as a physical hub and digital studio that will house components for incubating, developing, testing and implementing curricular innovations for our "master learners." The lab will also bring together interprofessional groups of teachers, students, learning specialists and information technology experts to develop and test new approaches and new tools for students across all three UMMS graduate schools and our Graduate Medical Education program. Examples of the creative teaching methods to be developed in this space include:

- **Integrated virtual anatomy** from the subcellular microscopic level to the whole human body, utilizing advanced tools such as the Anatomage virtual anatomy table, virtual microcopy and traditional dissection. This enables students to master a functional and structural understanding of human anatomy as it may be encountered in the clinic, the CT or MRI scanner, or the operating room.
- **Game-based immersive learning**—an innovative approach to learning that combines aspects of simulation and virtual reality with game playing to create virtual critical decision-making scenarios that can provide immediate feedback and "rewards" for mastering skills and goals. Game-based learning engages students in active learning, both as individuals and as members of teams, building group learning experiences, performance quality, skill development and mastery, and interprofessional teamwork.
- **Virtual patients and the virtual electronic medical record (v-EMR)**: In creating a real-world health care environment in an educational setting, the v-EMR will enable students as individuals and as part of interprofessional health care teams to actively care for "patients." Students will encounter their v-EMR patients on the first day of training, providing the opportunity to learn about and practice comprehensive, continuity-based patient care throughout the four-year program. Some of these patients may be "live," portrayed by trained actors from our standardized patient program, while others may be virtual and encountered in a setting simulated by interactive, computer-based technology. These scenarios will provide our students with hands-on opportunities to learn about high-quality patient care that is patient-centered, effective, evidence driven, safe and cost conscious, which will prepare them as master learners in the care of actual patients as students and as future doctors.