2013-15 CATALOGUE



University of Massachusetts Medical School

School of Medicine









Advancing the health and well-being of the people of the Commonwealth of Massachusetts and the world through pioneering education, research and health care delivery.



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This catalogue is intended to provide academic and nonacademic information about graduate study at UMMS to persons who work and study here, to persons who may be interested in applying for admission and to the general public. UMMS is fully accredited by the Liaison Committee on Medical Education and the New England Association of Schools and Colleges.

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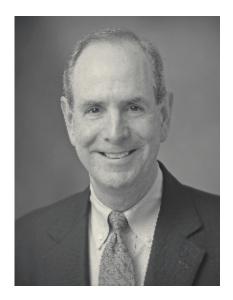


School of Medicine

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CATALOGUE





Message from the Chancellor

The history of every great institution is filled with significant moments. For UMass Medical School (UMMS), our moment is now.

Our state's only public academic health sciences center is flourishing and increasing its renown, both here at home and around the globe. We continue our vital mission to educate scientists and health care practitioners; care for those who are most in need; push to the forefront of innovation and scientific discovery; and serve communities that are close to home and continents away.

We recently opened a state-of-the-art education and research facility, the Albert Sherman Center, one of the finest education and research complexes found at any medical school in America. Our faculty, programs and facilities clearly reflect the outstanding research we undertake and the superb education we provide. With the opening of this impressive building, UMass Medical School is now ideally positioned to realize our full potential.

Our unique strengths include a top-ranked primary care program, an innovative learnercentered medical education curriculum and groundbreaking research in some of the most promising biomedical fields. We attract more than \$250 million in grants annually and our researchers consistently produce vital advances in basic and clinical science. We are a key partner in the state's visionary, 10-year, \$1 billion Massachusetts Life Sciences Initiative, enacted in 2008. We are also in the third year of a prestigious five-year Clinical and Translational Science Award from the National Institutes of Health, placing UMMS among an elite consortium of 55 nationally prominent research institutions that is working to move laboratory discoveries into treatments for patients, engage communities in clinical research and train a new generation researchers.

As a deeply caring and supportive community, we place the highest priority on civility and respect for the dignity and diversity of each individual. Many of our faculty, staff and students devote time to public service both here in Worcester and, increasingly, around the world. We are helping the city of Worcester re-invigorate its public health system, advising Liberia on the design of their health care system and working with Haiti to rebuild the country's medical education system.

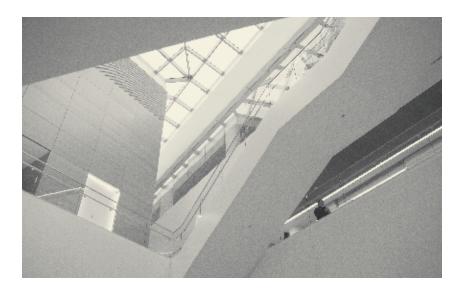
This is our moment, one that is characterized by change, growth and transformation. Despite the dynamism and continued evolution of our institution, we never lose sight of our core mission, which is to support each of our students in his or her dream of becoming a doctor.

It is my pleasure to welcome you as you explore our school and learn more about us.

Michael F. Collins, MD

Chancellor University of Massachusetts Medical School

Senior Vice President for the Health Sciences University of Massachusetts



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Message from the Dean

This is an exciting time to be a member of our UMass Medical School community. We recently successfully completed two important accreditation processes, receiving a full eight-year accreditation from the Liaison Committee on Medical Education (LCME), the primary accrediting body for medical schools, and a full 10 years from the New England Association of Schools and Colleges (NEASC). Further, we have a plethora of new facilities and a new curriculum now fully implemented across all four years of our medical education program. There is a palpable campus energy as we enter an exciting chapter in the history of the commonwealth's only public medical school.

After years of preparation, planning and building, we are finally set to take advantage of two major milestones: the Learner-centered Integrated Curriculum (LInC) and the opening of our 512,000-square-foot learning and research facility, the Albert Sherman Center. This beautiful \$400-million education and research center opened in January 2013 and has already become the focal point of campus life.

The new curriculm, LInC, emphasizes early patient care experience; strong patient and patient family communications skills development; interprofessional teamwork; and promotion of life-long learning skills. Since LInC's implementation, our students have met all educational milestones, and their scores and passing rates for the United States Medical Licensing Examination Steps 1 and 2 exams have risen dramatically and are well above the national averages.

The five Learning Communities, an integral part of LInC, have dedicated space within the Sherman Center. Learning Communities provide a higher faculty-student mentor ratio, and foster a greater sense of community across the class years. The interprofessional Center for Experiential Learning and Simulation just across the hall from the Learning Communities, and the additional

campus amenities, such as the new fitness center and cafeteria, add to the newly enhanced sense of campus community here at UMass Medical School.

Cutting-edge clinical and translational research is already flourishing within the Sherman Center. The open design of the research spaces supports interdepartmental collaborations across traditional boundaries, which are vital to the success of these scientific endeavors. We hope the unique design paired with the work of our outstanding faculty will result in transforming bench discoveries, which will be rapidly translated to the bedside or into actual treatments, cures and preventions for devastating diseases. All of this exciting research is steps away from the state-of-theart educational spaces. At UMass Medical School, we believe we have created the ideal learning environment.

In 2009, UMass Medical School committed to increasing our School of Medicine class size by 25 percent each year for four years. This class expansion reflects our commitment to build a physician workforce that will meet the growing needs of the commonwealth and beyond as we fully implement national health care reform.

It is an exciting time to be a member of the UMass Medical School community. I look forward to seeing what the next chapter holds, and I welcome you to join me on this journey.

Terence R. Flotte, MD

The Celia and Isaac Haidak Professor of Medical Education

Dean, Provost and Executive Deputy Chancellor

University of Massachusetts Medical School



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University of Massachusetts Medical School

The University of Massachusetts Medical School (UMMS) was founded by proclamation of the governor and an act of the legislature to meet the health care needs of the residents of the commonwealth. Its mission is to advance the health and well-being of the people of the commonwealth and the world through pioneering education, research and health care delivery with its partner, UMass Memorial Health Care. UMMS is one of five campuses that make up the University of Massachusetts. Other campuses are located in Amherst, Boston, Dartmouth and Lowell.

The UMMS Educational Community

As of January 1, 2013

AS OF January 1, 2013	
Faculty (including voluntary) Basic science	3,085
full- and part-time faculty	323
Clinical full- and part-time facult	y 2,570
Nursing faculty	192
School of Medicine	
MD students	484
MD/PhD students	35
Alumni	3,401
Graduate School of	
Biomedical Sciences	
PhD students	338
MD/PhD students	35
Clinical and Population	
Health Research students	21
Master of Science in Clinical Investigation students	5
Alumni	705
	703
Graduate School of Nursing	5 4
MS students	51
Graduate Entry Pathway studen	
PhD students	21
Doctor of Nursing Practice stude	
Alumni	927

A local, regional and statewide health resource, UMMS comprises the School of Medicine, opened in 1970; the Graduate School of Biomedical Sciences, opened in 1979; and the Graduate School of Nursing, opened in 1986. UMMS also offers dynamic graduate medical education and continuing medical education programs.

Beyond fulfilling its core missions of health sciences education and public service, UMMS is home to a thriving biomedical research enterprise. With major funding from the \$1 billion Massachusetts Life Sciences Bill signed into law in 2008, UMMS research programs are central to the Massachusetts Life Sciences Initiative. Federal and private research grants and contracts reached almost \$250 million in fiscal year 2012, making UMMS one of the fastest-growing research institutions in the country.

In 2006, UMMS professor Craig C. Mello, PhD, and his colleague Andrew Fire, PhD, of Stanford University, were awarded the Nobel Prize in Medicine by the Nobel Assembly at Karolinska Institute for their discoveries related to RNA interference (RNAi). First published in the journal *Nature* in 1998, their research showed that a particular form of ribonucleic acid or RNA—the cellular material responsible for the transmission of genetic information—can silence targeted genes. This RNAi process offers astounding potential

for understanding and manipulating the cellular basis of human disease and for the development of new therapeutics for disease treatment and cure.

Educational Mission

Consistently ranked by U.S. News & World Report as one of the leading medical schools in the nation for primary care education, the School of Medicine has a foremost responsibility to provide our students with an accessible, comprehensive and personally rewarding medical education of the highest quality, and one that optimally prepares them to excel as tomorrow's physicianscaring, competent, productive and fulfilled in their chosen career, serving a diversity of patients, communities and the health sciences. The school is committed to training in the full range of medical disciplines, with an emphasis on practice in the primary care specialties, in the public sector and in underserved areas of Massachusetts.

Our educational program is supported by state-of-the-art educational and research facilities that have recently been expanded with the completion of the Albert Sherman Center. Opened in 2013, the Sherman Center provides cutting-edge research space in its six-story research tower, as well as educational resources that include the interprofessional Center for



Where Our Students and Residents Learn

UMass Memorial Health Care

- UMass Memorial Medical Center (Hahnemann, Memorial and University campuses)
- UMass Memorial-Clinton Hospital
- UMass Memorial-HealthAlliance Hospitals (Fitchburg and Leominster campuses)
- UMass Memorial-Marlborough Hospital
- UMass Memorial–Wing Memorial Hospital and Medical Center
- Barre Family Health Center
- Hahnemann Family Health Center
- South County Pediatrics
- Tri-River Family Health Center

Inpatient

- Baystate Medical Center
- Berkshire Medical Center
- Day Kimball Hospital
- Harrington Memorial Hospital
- Heywood Hospital
- Holyoke Medical Center
- Lahey Clinic Hospitals
- Milford Regional Medical Center
- Providence Behavioral Health Hospital
- Saint Vincent Hospital
- St. Elizabeth's Medical Center
- Mercy Medical Center
- · Worcester State Hospital

Outpatient

- · Community Health Connections
 - -Fitchburg Family Health Center
 - Greater Gardner Community Health Center
 - Leominster Community Health Center
- · Community Healthlink
- New Bedford Community Health Center
- Edward M. Kennedy Community Health Center
- · Family Health Center of Worcester
- Greater Lawrence Family Health Center
- Reliant Medical Group
- RiverBend Medical Group
- Southborough Medical Group
- Steward Medical Group

And 200 volunteer practices and clinics across the commonwealth.

Experiential Learning and Simulation (iCELS), a 24,000-square-foot comprehensive, full-service simulation center, as well as our 10,000-square-foot Learning Communities Suites, dedicated to supporting the five houses of our School of Medicine's Learning Communities Program. Located on-campus and easily accessible to all other campus facilities for education and research, the Sherman Center provides unparalleled space for our entire campus community, including a 350-seat amphitheater, dining facilities, conference rooms, relaxation areas, a threestory atrium, sky walk access to other campus buildings and a new fitness center with a full array of equipment and wellness programs.

After four years of planning, the School of Medicine has also launched its new curriculum, designed to fully integrate the clinical and basic sciences in a competency-

based framework, aligned with our six competencies for medical education: physician as professional, scientist, communicator, clinical problem solver, patient and community advocate, and person.

Our new Learner-centered Integrated Curriculum (LInC) is now in place, with the first year of LInC inaugurated with the entering class of 2010. The redesigned LInC program features comprehensive integration of the clinical and basic sciences; enhanced flexibility in the clinical clerkships allowing dedicated time for elective experiences in year three; educational methods that offer handson, team-based small group learning; technology enhanced educational methods that support independent, self-directed learning; personalized, continuity-based mentorship with dedicated faculty through the learning community model; and an

opportunity for all students to engage in scholarship and scientific inquiry through a capstone project experience. To support our new curriculum, the school's educational facilities have been renovated and expanded to create the ideal learning environment that will best prepare today's students as tomorrow's physicians.

Among these enhancements are our recently renovated anatomy labs with computer technology at each dissection table; our upgraded classrooms and amphitheaters with campus-wide wireless connectivity; our newly built integrated Teaching and Learning Center (iTLC) that serves as our cutting-edge, technology-infused classroom for interactive small group learning; and the newly opened iCELS, which provides access to an unparalleled array of simulation resources for hands-on teaching and learning. Centrally located in the Sherman Center and adjacent to the Learning Communities Suites, the iCELS features two floors of simulation technology, providing "one stop" access to the full range of simulation resources in a single, comprehensive facility.

ICELS is designed as a fully interprofessional resource for learning across the health professions, including medicine, nursing and the allied health professions, and across the spectrum of learners, from students and residents to trainees and licensed professionals. The first floor of iCELS features a 12-bed clinical skills lab, two surgical skills suites, four large team-training scenario rooms and a comprehensive array of task trainers that include "Harvey" and the "Anatomage" virtual dissector. Complementing the technologybased simulation resources, the second floor of iCELS houses our nationally recognized Standardized Patient (SP) program. Serving our educational program across all four years of the curriculum, the SP program provides UMMS students with hands-on practice and learning in physical exams, communication skills, medical interviewing and clinical problem solving. The second floor of iCELS houses a virtual outpatient clinic with 20 rooms, fully equipped for ambulatory care in the office setting. Throughout the iCELS facility, a system of web-based, digital recording and high-definition video play back

is fully integrated into the iCELS debriefing rooms and conference rooms.

At UMMS, our curriculum is nationally recognized for the outstanding clinical training of our students, preparing them for diverse career choices beyond medical school, whether in primary care or the medical specialties. In parallel with this exceptional clinical preparation, our fast-paced growth, leadership and worldwide recognition in health sciences research offers extraordinary research opportunities for our students.

The educational mission of the School of Medicine is further enhanced by 52 accredited residency and fellowship programs; cooperative degree programs with area colleges and universities; diverse community-based education programs across Massachusetts; outstanding achievements in clinical and translational research in the health sciences; and the Commonwealth Medicine division. dedicated to serving the state's broad community of health care and service agencies. As the commonwealth's only public medical school, UMMS places an emphasis on partnerships with the community, creating opportunities for students to learn in and contribute to serving Massachusetts communities and the care of its vulnerable and underserved populations.

The School of Medicine's educational program has been enriched through national grant awards that promote quality, innovation and national distinction in medical education. Over the past 10 years, these awards have included:

- Integrated Geriatrics Education:
 A Model Curriculum across the Medical Education Continuum, Donald W.
 Reynolds Foundation Aging and Quality of Life Program (2009-2013), addresses the special health care needs of the elderly through targeted, comprehensive curricula.
- NIDA Centers of Excellence for Physician Information, National Institute on Drug Abuse (2007-2011), providing targeted curriculum in prescription drug abuse education.

- American Medical Association's, Innovative Strategies for Transforming the Education of Physicians (ISTEP) (2005-present), a national consortium of medical schools dedicated to furthering rigorous research in medical education.
- Stemmler Medical Education Grant,
 National Board of Medical Examiners
 (2003-2005), investigating the use of standardized patients in assessing medical students' behaviors and skills in the domain of professionalism.
- Educational Development for Complementary and Alternative Medicine (2003-2007), integrating educational objectives and curricula in complementary and alternative medicine into the mainstream of the Medical School curriculum.
- A Comprehensive Approach to Sexual Health in Undergraduate Medical School Curricula, Pfizer, Inc. (2001-2003), promoting the development of curricular innovations in sexual health.
- Enhancing Gerontology and Geriatric Medicine Education in Undergraduate Medical Education, AAMC/John A.
 Hartford Foundation (2001-2003), dedicated to enhancing our students' preparedness and commitment to care for the needs of the elderly.
- Macy Initiatives in Health
 Communication, Josiah Macy, Jr.
 Foundation (1998-2006), a multistaged project designed to catapult communication skills into the mainstream of medical education.

Educational Partners and Affiliates UMass Memorial Health Care

UMass Memorial Health Care, Inc. is the clinical partner of the University of Massachusetts Worcester and the largest health care system in Central and Western Massachusetts. It is a not-for-profit, integrated system designed to provide all levels of health care from primary to quaternary. UMass Memorial Health Care delivers care through the UMass Memorial Medical Center and community hospitals (Clinton Hospital, HealthAlliance Hospital, Marlborough Hospital and Wing Memorial Hospital and Medical Centers) with health

care services further enhanced and augmented by community primary care practices, ambulatory outpatient clinics, home health agencies, hospice programs, rehabilitation and mental health services.

As the region's tertiary referral center, UMass Memorial Medical Center offers a full complement of advanced technology and support services, providing the region with a broad range of specialists renowned for their expertise in clinical areas, including the Centers of Excellence—heart and vascular, cancer, musculoskeletal and diabetes—as well as emergency medicine, surgery, women's health and children's medical services.

UMass Memorial Medical Center is a 781-licensed-bed facility on three campuses: Hahnemann, Memorial and University. UMass Memorial Medical Center records 138,000 visits per year at its two emergency departments located on the University and Memorial campuses. In 2010, for the third year in a row, UMass Memorial Medical Center ranked number one in Massachusetts and New England for surviving a heart attack. UMass Memorial Medical Center is also the region's transplantation center and provides liver, kidney, pancreas and bone marrow transplantation.

On the University Campus, clinical services are focused on radiation therapy and cancer care, neurology, trauma and critical care, psychiatry, surgery and advanced cardiovascular care. The Cardiovascular Center of Excellence at the UMass Memorial Medical Center provides integrated, patient-centered heart and vascular care by utilizing the latest research and technology available in cardiovascular medicine and surgery.

The Weight Center provides medical and multidisciplinary support services in the specialty of bariatric medicine, including gastric bypass surgery, behavioral therapy and comprehensive follow-up care for weight management. The University Campus is also home to the Children's Medical Center, providing extensive services, including the internationally recognized newborn intensive care unit, orthopedics, gastroenterology, neurology, pulmonology, oncology and surgery, and the only pediatric intensive care unit in Central Massachusetts. The Children's

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Medical Center offers the Child Protection Program, providing evaluations of children for suspected abuse, neglect and maltreatment. The Children's Medical Center is accredited by the prestigious National Association of Children's Hospitals and Related Institutions, a designation that identifies it as a facility that delivers exceptional care to children.

Also located on the University Campus, the Duddie Massad Emergency and Trauma Center, the region's only Level I trauma center, is the home base of Life Flight, New England's first hospitalbased air ambulance and the only emergency helicopter service in Central Massachusetts. Since its founding in 1982, Life Flight has become one of the busiest single-aircraft services in the country, with more than 25,000 patient flights. The **Duddie Massad Emergency and Trauma** Center provides training and consultation to providers and appoints medical directors for area towns' emergency medical services. UMass Memorial also sponsors the Disaster Medical Assistance Team -Massachusetts (DMAT-MA2), a volunteer group of professional and paraprofessional medical personnel who augment local medical efforts and provide emergency medical care during a disaster or other adverse event.

The University Campus is the site of the new Ambulatory Care Center (ACC), offering a unique complement of state-of-the-art patient care clinics and translational research programs in a seven-story, 258,000-square-foot building. The ACC opened in 2010 and provides convenient access to outpatient services for cancer, diabetes, heart and vascular, and orthopedics as well as diagnostic testing services.

The Memorial Campus is a leading provider of acute care services in the greater Worcester area and offers a broad array of primary, secondary and tertiary care services. The maternity center delivers more than 4,000 babies a year, more than any hospital in the region. It is the regional referral center for women with high-risk pregnancies, and it provides the region's only Level III Newborn Intensive Care Unit, a 49-bed unit providing the most advanced life-saving care for fragile infants. The Levine Ambulatory Care Center

on the Memorial Campus is the site of the New England Hemophilia Center and provides cancer services, including radiation oncology, gynecological oncology and infusion treatments. The Department of Urology is also located on the Memorial Campus, with clinics in the Levine Ambulatory Care Center. The full spectrum of urologic care is offered including cancer care, infertility, stone disease and robotic surgery, among others. The Levine Center is also the hub for all of UMass Memorial Medical Center's presurgical evaluation services.

In addition, the Spine Center and the Arthritis and Joint Replacement Center, also located on the Memorial Campus, provide a full spectrum of multidisciplinary care for orthopedic patients, including arthroscopic and open surgery for injury and orthopedic disease. Cardiologists also see patients for routine visits and diagnostic testing.

The Hahnemann Campus is a patient-centered, full-service outpatient center, focusing on dermatology, hand and upper extremity surgery and therapy, sports medicine, ophthalmology and cosmetic surgery. This state-of-the-art ambulatory surgery and specialty care practice center offers day surgeries in many specialties as well as laboratory, mammography and X-ray services and primary care services at the Hahnemann Family Health Center.

Clerkships are offered in family medicine, medicine, obstetrics & gynecology, pediatrics, psychiatry, surgery and neurology.

Major Teaching Hospital Affiliates

In addition to UMass Memorial Medical Center, UMMS has major educational affiliations with Saint Vincent Hospital in Worcester, Berkshire Medical Center in Pittsfield and Milford Regional Medical Center in Milford.

Saint Vincent Hospital at the Worcester Medical Center is a 348-bed acute care hospital that offers a variety of specialty care centers, including laparoscopic surgery, cardiovascular medicine, cancer medicine, family-centered maternal and child health services, general and vascular surgery, neurosurgery, psychiatric services, orthopedics and advanced diagnostic

services. An extensive array of outpatient services, including same-day surgery, radiation oncology and a pain clinic, are also available. Clerkships available to UMMS students include medicine, neurology, obstetrics & gynecology and surgery, and subinternship in medicine. Independent residency programs are offered in cardiology, internal medicine, podiatry, sleep medicine, MICU and radiology.

Berkshire Medical Center in Pittsfield is a 293-bed acute care community teaching hospital serving residents of Berkshire County as well as Eastern New York, Northern Connecticut and Southern Vermont. It offers a full range of medical services, including anesthesiology, cardiology, dentistry, emergency medicine, family medicine, internal medicine, neurology and neurosurgery, obstetrics & gynecology, ophthalmology, orthopedic surgery, otorhinolaryngology, pathology, pediatrics, psychiatry, radiation oncology, radiology, rehabilitation, substance abuse, cardiac rehabilitation, a sleep disorders program and others. Clerkships are available to UMMS students in medicine, obstetrics & gynecology, neurology, psychiatry and surgery. Fourth-year subinternships are available in medicine, psychiatry and general surgery. An extensive list of fourth-year electives includes cardiology, consultation psychiatry, emergency medicine, infectious disease, laboratory hematology and hematopathology, nephrology, occupational health, orthopedic surgery, pathology (anatomic and clinical), physical medicine and rehabilitation, primary care internal medicine, pulmonary medicine and radiology (diagnostic and/or interventional). Independent residency programs are offered in internal medicine, psychiatry, surgery, osteopathic medicine and dentistry. The UMMS associate dean for medical education for Berkshire Medical Center is onsite to supervise all clerkship rotations and is available to all students for career discussions.

Milford Regional Medical Center is a nonprofit, acute care, full-service, 121-bed community and regional teaching hospital, serving a region comprising 20 towns. In addition to providing basic acute care services such as medical, surgical, family-centered obstetrics and pediatrics, Milford Regional provides a full range of clinical services, from adolescent health to women's services. Clerkships are available in medicine, obstetrics & gynecology, and neurology. There are also electives in cardiology and gastroenterology.

UMMS Schools and Other Sites

Along with the School of Medicine, UMMS comprises the Graduate School of Biomedical Sciences (GSBS) and the Graduate School of Nursing (GSN). The GSBS has two divisions—Basic & Biomedical Sciences and Clinical & Translational Sciences—that offer 10 programs of study. Students are trained in their selected specialty area and receive a broad background in the basic medical sciences, in preparation for research with direct relevance to human disease. Graduates are equipped to collaborate with scientists and physicians involved in basic research and clinical observations and are prepared to initiate careers as educators in schools of the health professions or in the biotechnology industry.

The GSN offers master's, post-master's and doctoral degrees, providing high quality education to prepare registered professional and advanced practice nurses within nurse practitioner and nurse educator specialties for faculty, research and other nursing leadership positions. Subspecialty professional and clinical education is also offered in selected areas. The basis for study includes theoretical foundations of professional and advanced practice nursing, research process and design, societal forces that influence nursing, advanced pathophysiology, pharmacology, health assessment, clinical decision making, specialty content and clinical education.

The UMMS extended campus includes the Brudnick Neuropsychiatric Research Institute and labs and offices within the



Massachusetts Biotechnology Research Park in Worcester; sites in Shrewsbury and Auburn; the Eunice Kennedy Shriver Center; and the New England Newborn Screening Program and MassBiologics, with facilities in Jamaica Plain and Mattapan.

Public Service Mission

The faculty, students and staff at UMass Medical School are committed to making an impact on the health and well-being of the people of the commonwealth and the world. Every day, in ways large and small, our institutional community is actively and passionately engaged in the communities we serve, undertaking numerous and varied outreach initiatives with partners in the academic, business and philanthropic fields. Collaborations include a new partnership with Special Olympics of Massachusetts to advance its Healthy Athletes initiative; the long-running Worcester Pipeline Collaborative and Regional Science Resource Center, both award-winning programs recognized as national models for K-12 science, technology, engineering and mathematics education outreach; and student-run, faculty-supervised free clinics that provide care for underserved and economically disadvantaged patients.

By working with schools, community groups and social service organizations, UMass Medical School has extended its reach into places where we can make a difference. And by creating and sustaining relationships with the social and cultural fabric of the region—and, indeed, much of the world—we provide both real-world help and role models for the next generation of nurses, doctors, researchers and leaders.

The Office of Global Health is the latest method to broaden the Medical School's reach. The office coordinates and optimizes current and future endeavors in global medicine to elevate it to a more visible, high-impact initiative; is developing a network of international activities that can inspire UMMS medical, nursing and basic science students as on-site teachers and practitioners; and enhances training of health care providers internationally. The Office of Global Health also works with the Office of Research to help coordinate specific clinical trials and epidemiological studies as these opportunities arise.



Commonwealth Medicine

UMass Medical School brings its public mission beyond the walls of the University through its public service consulting and operations division, **Commonwealth**Medicine (CWM). The division reaches beyond the traditional boundaries of academia to establish research initiatives, training programs and clinical services focusing on the public sector. This approach—instrumental in creating groundbreaking programs in health care reform, public sector financing, clinical training and policy research—has met with remarkable success.

Today, CWM offers a range of programs and service lines, working with public health and human service agencies and other clients in 20 states and internationally. CWM provides these clients with health care consulting, service delivery, policy and program development, and financing services and strategies. Current efforts—and many successes—are the building blocks of the health care delivery model of the future.

The nation is experiencing some of the most profound changes to our health care system in generations, and the scope and complexity of these changes present real challenges for health care providers and payers, both in the government and private sectors. CWM experts helps clients deal with this tidal wave of transformation by providing expertise in building the infrastructure to make health care reform a reality.

Improving care for people with complex health care conditions is critical to improving their quality of life and also to managing the cost of care. An example of this is the Community Case Management program, which coordinates needed services for children disabled by complex, chronic medical problems. And CWM experts have helped manage one of Massachusetts' largest primary care transformation efforts with our involvement in the Patient Centered Medical Home Initiative—a program that is helping strengthen primary care practices throughout the commonwealth.

Facilitating educational opportunities for UMMS students, Commonwealth Medicine experts are frequent presenters of course material. They have developed many topics that are covered though Optional Enrichment Electives, the Interstitial Curriculum, and

the Flexible Clinical Experience Course.
These include areas such as health
policy, disabilities and multiculturalism.
Commonwealth Medicine experts have also
participated in many clerkships, grand rounds
presentations and monthly seminars in
collaboration with UMMS faculty.

CWM was instrumental in launching the Graduate Entry Pathway in the Graduate School of Nursing as a response to the growing need for professional nursing staff. In addition, we partnered with the Graduate School of Biomedical Sciences to develop the PhD program in Clinical & Population Health Research, one of the first in the nation to promote graduate study that fosters the analytic skills and methods necessary to conduct both health services and clinical research.

Commonwealth Medicine plays a critical part in the academic success and economic viability of UMMS. In fiscal year 2012, it produced nearly 150 scholarly articles and other publications. Additionally, the division generated more than \$380 million in grants and contracts during that time, which translates to millions of dollars for UMMS—funds that support the quality and sustainability of its world-class research and education programs.

Learn more about Commonwealth Medicine at http://commed.umassmed.edu.

Research Mission

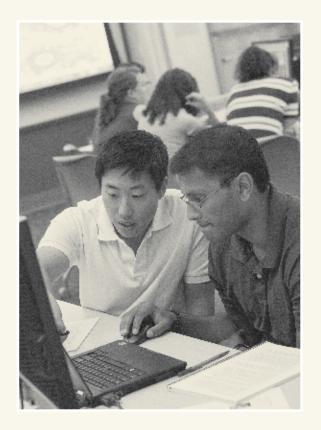
The research mission of UMMS is to promulgate scientific inquiries that produce groundbreaking discoveries in the basic and clinical sciences. Currently supporting more than 300 investigators, the growing UMMS research enterprise has led to stimulating advances in the treatment of disease and injury, as UMMS scientists undertake research to discover the causes of and cures for the most devastating diseases of our time.

Accomplished faculty members include a Nobel Prize winner; a Lasker Award recipient; two members of the National Academy of Sciences; a member of the Royal Society; six Howard Hughes Medical Institute Investigators; Banting Medal awardees; Pew and Keck scholars; MERIT awardees; a Fellow of the American Association for the Advancement of Science; cancer research award recipients and many other winners of scientific accolades. Capitalizing on a collaborative environment, UMMS research expertise lies in both basic and clinical areas with concentrations in diabetes, molecular genetics, immunology, virology, HIV/AIDS, cancer, signal transduction, structural biology (with attention to innovative drug design), bone cell biology, chemical biology, gene function and expression, neuroscience, imaging, and occupational and environmental health.

Research growth is reflected in increased funding levels. Extramural funding has more than doubled, from \$89 million in fiscal year 1998 to almost \$250 million in fiscal year 2012.

Today, UMMS is proud to be at the forefront of the commonwealth's life sciences initiative, having received funding in 2007 and 2008 to establish an Advanced Therapeutics Cluster (ATC) on campus. The ATC brings together an interdisciplinary group of research faculty and physician-scientists in three interconnected research clusters—stem cell biology, RNA biology and gene therapy. RNA studies at UMMS are conducted by world leaders in the field.

The ATC is housed in the Albert Sherman Center, a new research and education facility opened in 2013 that adds approximately 512,000 square feet to a campus that has grown exponentially over the past 10 years. The Albert Sherman Center doubles the campus's research capacity and follows on the heels of the Aaron Lazare Medical Research Building, an innovatively designed research facility that added 360,000 square feet of laboratory space to UMMS when it opened in the fall of 2001.



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School of Medicine Curriculum

In 2010, the School of Medicine launched its new Learner-centered Integrated Curriculum (LInC), based on new vision and principles to guide the training of 21st-century physicians. Designed with input from more than 400 faculty and students, LInC incorporates innovations in teaching and learning as well as new national standards for medical education. The medical education program is designed to develop six foundational competencies required of all physicians: professional, scientist, communicator, clinical problem solver, patient and community advocate and person. Grounded in these required core competencies, the School of Medicine educational program prepares students for their future medical careers regardless of specialty choice, while maintaining our founding commitment to prepare students for training in the primary care disciplines. Our philosophy values partnership between students and faculty in teaching and learning; respect and dignity in the physician-patient and student-learner relationship; and an educational milieu of collegiality, collaboration and diversity.

Learner-centered Integrated Curriculum Innovations

- Integrated Basic Sciences
- Early Clinical Electives
- Formal Transitional Studies Curricula
- Foundational Studies Curriculum
- Core Clinical Experiences
- · Advanced Studies Curriculum
- Longitudinal Themes
- · Learning Communities
- Capstone Scholarship and Discovering Course

Competency Standards

- Physician as Professional
- · Physician as Scientist
- · Physician as Communicator
- Physician as Clinical Problem Solver
- Physician as Patient and Community Advocate
- Physician as Person

Overview: Learner-Centered Integrated Curriculum (LInC)

In partnership with our diverse faculty, students, alumni and educational leaders, the Medical School completed a comprehensive four-year curriculum redesign, with the new Foundations of Medicine 1 (FOM1) curriculum launching with the entering class of 2010, and subsequent years being implemented annually, culminating in the new Advanced Studies (AS) year launching in May 2012. Guided by the school's competency-based framework established in 2003, our LInC redesign process translated the six foundational competencies into an innovative, state-ofthe-art educational program. Additional LInC innovations include the following:

 Enhancement of engaged learning through limitation of scheduled curriculum hours and expansion of independent study, varied teaching methods and development of online student preparatory exercises.
 The goal is to better utilize student-faculty

- interaction time and to promote selfdirected and lifelong learning through increased student responsibility for active learning.
- Diversity of teaching methods, including interactive large and small group settings, online exercises, podcasts, video archives of lectures, simulation, standardized patients, peer-to-peer teaching and direct patient encounters.
- Utilization of state-of-the-art technology to appropriately support student learning with digital and electronic systems—in both large and small group settings through a technology-enhanced anatomy laboratory facility, an integrated Teaching and Learning Center (iTLC), and the interprofessional Center for Experiential Learning and Simulation (iCELS).
- Broadening of student assessment methods, including formative assessment (which provides feedback to students without contributing to grades) balanced with summative assessment (which contributes to student grades), as well as electronic USMLE-type exams;



short answer questions; simulation and standardized patient tests; graded exercises; and participation in small-group sessions.

 Scheduled time for students to participate in pathway programs, community-based activities, interest groups, optional enrichment offerings and research activities, including clinical/translational research pathway, master's in clinical science investigation and MD/PhD programs in biomedical and clinical/ population health sciences.

As an integral aspect of the LInC redesign effort, the School of Medicine began a four-year initiative to dramatically enhance the training of medical students, residents and practicing physicians in geriatrics. Funded through a grant award from the Donald W. Reynolds Foundation, this initiative provides extensive resources to support the implementation of a comprehensive geriatrics curriculum as a longitudinal theme across all four years of the school's educational program.

To provide a state-of-the-art learning environment to support the curriculum redesign, UMMS has undergone a major transformation of its educational facilities and resources, including the new, state-ofthe-art anatomy laboratory facility; creation of an integrated Teaching and Learning Center (iTLC), featuring interactive, technology-based and multimedia capabilities for small group and conference-style teaching and learning (dry lab); provision of cutting-edge technology in teaching laboratories and lecture halls; expanded and enhanced facilities for experiential learning and simulation to support hands-on clinical training utilizing simulation technology and standardized patients; expanded on-site computer access for students and wireless connectivity throughout the campus; and enhanced student life facilities.

In addition, the opening of the Albert Sherman Center in 2013 provided five dedicated learning communities houses for our School of Medicine students. Each house contains three small group teaching rooms, space for meeting with faculty mentors, and informal gathering space for students. The houses are linked on

two floors of the ASC and provide direct access to dedicated kitchen space. They are adjacent to the Graduate School of Nursing learning community and the new 24,000-square-foot interprofessional Center for Experiential Learning and Simulation (iCELS), which supports opportunities for students to participate in formal and informal interprofessional experiences. The iCELS houses our expanded standardized patient program and increases our simulation capacity with more high fidelity manikins, task-trainers, surgical simulators and screenbased "virtual" simulation resources.

Our faculty and technology experts have partnered to create a robust array of educational resources, including an online curriculum with video and pod capture of course lectures; the web-based curriculum calendar, providing students and faculty with universal, up-to-date access to course schedules and educational events; technology-based classroom sessions that integrate online, interactive teaching into large group lectures; and computer-based independent learning modules that include high resolution image databases, interactive learning exercises, web-based clinical simulations and computer-based testing.

Our curriculum emphasizes early patient care exposure from the first weeks of medical school: strong clinical skills development in communications, clinical problem solving and professionalism; student activism in community service and advocacy; diverse opportunities for research and promotion of lifelong learning skills. Learning Communities, which bring together small groups of students and faculty across class years for formal and informal teaching and mentoring, are an integral component of our comprehensive curriculum redesign. Educational methods promote active scholarship and engaged, interactive learning, with hands-on practice under the close observation of faculty.

As a supplement to students' learning in the clinical setting, our nationally recognized Standardized Patient Program, and other simulation resources housed in iCELS, provide opportunities for ongoing practice, improvement and mastery of essential clinical skills. Our courses and clerkships are

continuously enhanced and renewed to keep pace with the rapidly changing science of medicine, evolving standards of professional medical practice and state-of-the-art educational methods and technologies.

Foundations of Medicine FOM1 (Year 1) and FOM2 (Year 2)

The first two years of the educational program provide the essential foundations of the medical sciences, clinical skills and professional values to serve students' lifelong learning needs and career paths as physicians. The curriculum emphasizes current advances in the life sciences; applications and clinical correlations to patient care; integration of content across years and courses; opportunities for selfdirected, independent study; teaching and learning in teams; and cross-disciplinary teaching models that engage clinicians, basic scientists and the broad spectrum of health professions trainees in nursing, the social sciences, public health and the allied health professions. Grading for both FOM1 and FOM2 is pass-fail.

Students begin FOM1 with a **Transition to Medical School** curriculum, which acclimates entering students to the medical school structure by attending to their intellectual, social and emotional needs in preparation for the academic rigor of medical education. Topics include an orientation to Worcester and to the Medical School's student support resources, introductions to learning communities, professionalism, and strategies for learning and test-taking. This transitional curriculum culminates in basic life support certification, preparing students to act as first responders.

The **Doctoring and Clinical Skills** (DCS) course, which runs throughout both FOM1 and FOM2, utilizes learning communities as the primary mechanism for supporting student engagement in personal and professional development and lifelong learning through a skill-based curriculum with faculty mentors who foster long-term relationships with students throughout their medical school experience. Primary content offered in Doctoring and Clinical

Skills during FOM 1 includes the medical interview, communication in medicine, physical examination, clinical reasoning, professionalism and medical ethics. More specific applications include reinforcement of basic science content from the clinical perspective, oral presentations, working in teams, physician (and student) as teacher, application of appropriate evidence-based medicine, cultural diversity in patient care, determinants of health, health care systems and balancing personal and professional life. This longitudinal, multi-component course comprises more than 300 hours of required curriculum time across FOM1 and FOM2 and draws upon approximately 300 faculty.

The course has three main components: Doctoring and Clinical Skills small groups, in which students meet regularly with two faculty facilitators to acquire skills in course competencies, and two practice laboratory components—the Longitudinal Preceptorship Program (LPP) and the Physical Diagnosis course (PD). LPP places students in the clinical setting beginning in the first weeks of medical school, providing the opportunity to interact with patients under the supervision of an assigned faculty physician preceptor. Diverse preceptorship sites are available, including urban, rural and underserved settings, located in various clinical sites throughout Worcester county and neighboring towns, within a one-hour commuting distance of the Medical School, Students attend LPP sessions an average of every other week during the first two years, first shadowing their assigned preceptor, and then actively practicing clinical skills introduced in Doctoring and Clinical Skills small groups. In PD, the principles of the normal and abnormal physical examination are taught and practiced, providing opportunities for early hands-on practice of physical exam skills with standardized patients (SPs) in our new iCELS and, subsequently, with patients at various clinical sites. As with the preceptorship program, these sites are located across Worcester County and the Central Massachusetts region, generally within a one-hour commuting distance from the campus. Students are responsible for providing their own transportation for these educational experiences. For practicing

and developing clinical skills on campus, students and faculty benefit from our fully equipped iCELS with 20 rooms dedicated to teaching and learning physical diagnosis and exam techniques. In addition to this physical diagnosis component and the longitudinal ambulatory care experience, DCS also provides students with an inpatient "Clinical Immersion," in which they observe and reflect on the structure and practice of inpatient medicine in the first months of their education by shadowing a clinical physician team and nurse and working more closely with a hospitalized patient.

UMMS Learning Communities are composed of "houses" into which students are randomly assigned upon enrollment, with 20 Learning Community mentors dedicated to student teaching who are selected for their exceptional educational skills and clinical experience as well as personal and professional characteristics. Learning Communities are designed to enhance the quality of student-teacher and student-student relationships by developing longitudinal interactions between students, faculty and peers from other classes throughout the four-year educational program. This model improves continuity of teaching doctoring and clinical

Academic Year — Important Highlights for Academic Year 2013-2014

May

- Transition to Core Clinical Experiences (CCE) for clinical students
- Interstitial Curriculum begins for CCE students (sessions span the year)

August

- Start of Fall Semester for FOM1 and FOM2 students
- Transition to Medical School curriculum for FOM1 students

September

- Convocation for all medical students
- White Coat Ceremony for FOM1 students

October

- Population Health Clerkship
- Interprofessional Immersion Experience for FOM 2 students

November

 Career Day—Part 1 for Core Clinical Experiences students

December

 End of Fall Semester for FOM1 and FOM2 students

January

- Start of Spring Semester for FOM1 and FOM2 students
- Career Day—Part 2 for Core Clinical Experiences students

March

- Match Day for Advanced Studies students
- Introduction to Core Clinical Experiences for FOM2 students
- Formative Foundational Assessment for FOM2 students

April

- Oath Ceremony for FOM2 students
- Preparation for USMLE Step I for FOM2 students
- Comprehensive Core Clinical Assessment for CCE students
- Career Day—Part 3 for Core Clinical Experiences students

May

- End of Spring Semester FOM1 and FOM2 students
- Certification for graduation for Advanced Studies students
- Transition to internship for Advanced Studies students

June

 Commencement for Advanced Studies students



skills, supports interactive and small group teaching, fosters students' self-directed learning and develops students' skills in formal and informal peer teaching and mentoring. Each Learning Community has its own assigned house in the Learning Communities suites housed in the Sherman Center, where students from each house can convene and interact as needed.

The first biomedical science course, **Building Working Cells and Tissues,** introduces and applies key principles of biochemistry, histology, physiology, carbohydrate metabolism and cellular genetics to an understanding of how cells and tissues are built and how they work. The course is structured to initiate clinical thinking processes, promoting the application of scientific knowledge to solving medical problems, including an early introduction to mechanisms of disease, which provides the framework for expansion in subsequent courses. Building Working Cells and Tissues makes extensive use of cases to illustrate clinical aspects of basic scientific concepts and features collaborations between basic scientists and clinician faculty to illustrate these topics.

In addition, LInC expands the popular Integrated Case Exercises program to a longitudinal two-year experience, drawing content from all FOM1 and FOM2 courses. Integrated Case Exercises provide structured opportunities for students to apply their foundational knowledge to guided clinical problem-solving. The program engages basic scientists and clinicians to teach together

interactively, emphasizing the relevance and application of basic sciences to clinical care and integrating content from anatomical, physiological, biochemical, genetic, epidemiological and human (patient/family) perspectives. Other longitudinal content areas include nutrition, pharmacology, aging and evidence-based medicine.

Our Principles of Human Genetics course recognizes the critical role of genetics in current and future medical research and practice; it runs concurrently with and complementary to Building Working Cells and Tissues. The Principles of Human Genetics course focuses on essential genetics principles that provide a foundation for further learning in other FOM courses as well as in the Core Clinical Experiences. Specific content includes basic cellular and molecular genetics and clinical application in areas such as chromosomal abnormalities, genetic diseases, the human genome project, reproductive genetics, cancer genetics, genetics of aging, gene therapy, stem cells and cloning. The course highlights contemporary ethical, legal and social issues of genetic privacy, the genetic nondiscrimination act and emerging topics, such as epigenetics and personalized medicine based on genetic variants.

These courses build the foundation for **Development, Structure and Function,** a course that examines how the human body develops and how it works by presenting an integrated view of anatomy, histology, physiology, embryology and growth. This course emphasizes both the regional and

systemic approaches to human biology and medicine and applies patient cases and clinical imaging in an integrated learning experience that models the clinical-reasoning of real medical practice. This course is integrated so that dissection, physiologic function and imaging occur in closely related sections that reinforce each other. Related microanatomy/histology, embryology and case presentations support students' continued integration, understanding and building of knowledge.

The Development, Structure and Function course offers exceptional learning experiences including cadaver dissection in small groups in our state-of-the-art anatomy labs with pull-down, cadaver-side computers and online interactive dissectors for each table; an anatomy resource center; an introduction to surgery; multiple prosections and clinical procedural demonstrations. Supplemental activities draw on the medical humanities, including presentations on the history of human anatomy, discussions of death and dissection and an annual studentled memorial service honoring donors to the UMMS Anatomical Gift Program.

In addition to Principles of Human Genetics, two other courses—Principles of Pharmacology and Cancer Conceptspresent a similar model of learning that teaches essential principles that are subsequently applied in other courses in all four years of the curriculum. The Principles of Pharmacology course occurs in fall of FOM1 and introduces basic pharmacology principles and concepts, such as drug development and regulation, pharmacodynamics, pharmacokinetics, drug metabolism and neuroeffector systems. The course emphasizes how basic pharmacology principles impact treatment decisions, using clinical vignettes and case studies co-taught by clinicians and basic scientists, who together integrate basic principles into applied patient care. Cancer Concepts occurs in FOM2 and is a case-based course that features a combination of lectures and small group sessions covering the basic pathophysiology of malignancy. Each "cancer concept" is introduced or related back to one or more specific clinical cases. Students discuss assigned readings and participate in virtual laboratories, offering high-resolution

digitized pathology "slides" and threedimensional anatomic displays of various malignancies to understand cancer at the cellular, tissue, organ and organism levels. Introductions are provided to the three clinical disciplines of oncology (radiation oncology, surgical oncology and medical oncology) as well as the epidemiology and societal implications of cancer.

FOM1 ends with two seamlessly integrated courses: Host Defense and Blood and Infections. Host Defense and Blood provides an integrated overview of bone marrow, peripheral blood and inflammation and the major pathologic disorders in hematology and immunology, including autoimmune diseases and hematologic malignancies. Teaching includes online learning modules, virtual microscopy exercises, and student-led clinical case discussions and problem-solving sessions. The specific focus is on building students' basic science knowledge of the interactions between the blood and immune systems and applying relevant principles to clinical data and problem solving in hematologic and immune disorders. The Infections course includes the host response to and its defense mechanisms against infections, facilitating a close integration with the Host Defense and Blood course. Infections is taught from the global perspective of the infectious agents and diseases affecting our world and its inhabitants across all living organisms (from human to animal to microbe), diverse human populations and disparate environments. This course deals with the laboratory aspects, structure and pathogenic mechanisms of infectious agents that cause disease across populations and the developmental continuum from conception through childhood and the aging adult. Infectious agents are presented in the context of epidemiologic (population health) factors, including the psychological and social implications of various infections and the need for cultural competence in providers. The principles of the Infections course are linked to specific content in FOM2 organ-based blocks, correlating infectious disease pathology with microbial properties, presenting signs and symptoms, and differential diagnosis and treatment.

To help students synthesize the FOM1 content, our FOM2 **Organ System Diseases** course is introduced through its first critical organ block (cardiovascular), prior to the summer break and students' pursuit of summer activities. The entire OSD curriculum, which resumes after the summer break, covers a total of seven major organ systems (cardiovascular, renal, respiratory, gastrointestinal, reproductive, endocrine. musculoskeletal). Each OSD block follows similar structural and teaching principles and, for each organ system, covers the advanced physiology and pathophysiology as well as relevant pharmacology, infections, cancers, doctoring skills and clinical cases. Our new integrated Teaching and Learning Center (iTLC) provides a state-of-the-art technology-infused classroom designed to support interactive teaching and learning for the OSD and other FOM courses. With more than 4,000 square feet of educational space, the iTLC includes 14 plasma screens; six projectors; hard wire and wireless access to the Internet, our library and our online curriculum, which houses extensive image databases, including an "electronic slide box" of pathology slides as well as anatomic and histologic specimens. The iTLC environment supports interactive small group learning and independent, self-paced study as well as computer-based testing and remote teleconferencing. In the OSD course, the iTLC's educational technologies support the seamless integration of relevant basic science with clinical content relating to human disease, clinical cases and patient care, taught by faculty from multiple departments collaborating in lectures, case presentations and discussions. Students develop an in-depth understanding of disease by correlating underlying molecular and physiologic mechanisms with structural. functional and clinical manifestations, as well as learning initial approaches to diagnosis and management. Multi-system course components bridge individual organ blocks through interactive problem-solving sessions based on clinical cases. These sessions allow students to interact directly with faculty to solve clinical problems while integrating curriculum content across organ systems.

LInC includes a course focusing on the **Determinants of Health, which focuses** on community and population health, addressing the impact of community, culture and medical care systems on health, and the quantitative health sciences, including epidemiology and biostatistics. There is an emphasis on applying Determinants of Health principles to clinical care, screening, diagnosis and treatment of disease. and the role of physicians as advocates for individuals and populations within a multidisciplinary healthcare team. The course engages students in two substantial interprofessional activities. The first occurs in FOM1 and involves the teaching of epidemiology and biostatistics to small groups of medical and graduate nursing students. The second is a Population Health Clerkship experience, in which SOM students are placed with colleagues from the Graduate School of Nursing in diverse sites across the commonwealth to enhance their understanding of the importance of the community context in health and health care. These immersion experiences focus on underserved populations and the application of curricular principles to real-life community settings. Students focus on the problems and services among diverse racial, ethnic and cultural groups; gay, lesbian, bisexual and transgender patients; poor families; patients with HIV/AIDS; persons dealing with substance abuse; older adults; the homeless; people with developmental disabilities; abused children and incarcerated patients.

The Brain: Nervous System and Behavior is another major FOM2 course that runs concurrently with Organ Blocks. The course presents disorders of the nervous system and behavior as disorders of the "whole person" and takes into account genes, neurological substrate, behavior, environment and impact on the person and society. Structured as three concurrent tracks (psychiatry and behavioral science, neuroanatomy and neurophysiology, neuropathology and neurology), the course anchors teaching in clinical disorders and syndromes, including stroke, traumatic neurologic injury, depression, pain and memory loss. While integrating relevant pharmacology, infectious diseases and malignancies, the course

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emphasizes clinical problem solving and content relevant to general medical practice.

FOM2 culminates in a course titled Patients, which links self-assessment and formative assessment to selected multisystem problems and common and urgent clinical presentations in order to help students synthesize the learning in FOM1 and FOM2 as well as help students identify areas for specific focus in clinical learning. In addition a Formative Foundational Assessment (FFA) provides all students with the opportunity to encounter dynamic simulation cases in teams, practice focused history and physical exam skills with standardized patients, and apply knowledge from their foundational years to clinical practice. LInC allows ample time for preparation and completion of Step I of the U.S. Medical Licensing Exam (USMLE), which is required for licensure and for graduation from UMMS. The FOM 2 curriculum offers interested students the opportunity to participate in a comprehensive board review course for USMLE Step I, and the school also provides individualized test preparation support to all students through free access to the Comprehensive Basic Science Exam (CBSE) and a voucher for one Comprehensive Basic Science Skills Assessment (both are NBME sponsored practice tests). The professional services and the resources of the Center for Academic Achievement are also fully integrated into the USMLE Step 1 prep program. Multiple self-assessment opportunities and simulated USMLE experiences are available through the use of boards-type questions, NBME customized exams for course-related student assessment and online USMLEdesigned course-related tests. Our Center for Academic Achievement also provides specialized USMLE prep programs as well as individualized test prep support.

Core Clinical Experiences

Students enter their Core Clinical Experiences (CCE) by mid-May of the second year of medical school, allowing an earlier start to the clinical clerkships and enhanced flexibility and individualized exploration of clinical disciplines. In this model, students have the opportunity to craft a selfdirected learning experience that links four discrete one-week periods of time, called Flexible Clinical Experiences, to meet their individualized needs over the span of the CCE year. In addition they may choose elective experiences as early as spring of their third year of medical school, promoting more choice in the third year clerkship experiences and earlier electives for career exploration.

Advancement from FOM2 to Core Clinical Experiences represents a critical transition in the educational program as students enter the hospital wards, ambulatory clinics and physician offices and serve as participating members of health care teams providing direct care to patients and their families. Under faculty guidance and supervision, core clinical students actively apply the principles of clinical medicine to patient care, acquire essential technical skills and further develop personal and professional values to enable them to serve as caring, competent and compassionate physicians. The Core Clinical Experiences begins with the Transition to the Core Clinical Experiences, a curriculum designed to provide hands-on training and exposure to essential information and introductory skills to promote students' successful transition to their clinical rotations. This curriculum features small group sessions to review core clinical skills such as X-ray and EKG interpretation; heart, neurologic and musculoskeletal exam skills; basic life-support recertification and procedures such as blood drawing and simulation exercises in our iCELS. Also featured are presentations on important health care systems topics, such as utilizing electronic medical records, infection control, quality improvement and patient privacy.

Students begin their third year core clinical rotations, which feature experiences in seven required disciplines: internal medicine, surgery, family medicine, neurology, obstetrics & gynecology, pediatrics and psychiatry. These Core Clinical Experiences are organized into coordinated thematic sections that allow for disciplinespecific experiences as well as supporting interdisciplinary teaching, learning and assessment. Clinical rotations focus on hands-on mentored, experiential learning and are structured to include basic science content, a cross-disciplinary longitudinal curriculum (Interstitial Curriculum), and interdisciplinary and interprofessional experiences. The resources of the UMMS standardized patient program and simulation center provide state-of-the-art educational technologies to support ongoing clinical skills training, practice and mastery throughout the clinical years.

The Internal Medicine experience includes significant opportunities to work and learn in the acute care, inpatient setting with students rotating at UMass Memorial Medical Center, our clinical partner, and at one of our community-based educational affiliates, as well as immersion in the ambulatory care setting in a community physician's office. In addition to the general wards, students selfselect experiences with any of the medical subspecialties to broaden knowledge of diseases cared for by these specialists and characteristics of the profession. Students learn to diagnose and manage the major illnesses of adults of all ages as well as the principles and practice of health promotion and disease prevention. Essential skills in history-taking, clinical problem solving and physical examination are developed through hands-on practice and direct observation and feedback from faculty and standardized patients. The Internal Medicine clinical curriculum emphasizes an appreciation of the impact of illness on the patient, physician and society; the importance of professionalism and professional development; rapid and effective access to information; ways to assure patient safety; and the use of evidence-driven approaches to the diagnosis, management and prevention of disease. Students explore ethical dilemmas and issues surrounding the end of life and examine transfers of care between hospital and community settings. The core clinical experience utilizes the school's online

classroom system and a nationally developed case-based online curriculum to present course content at times convenient to students, allowing them fewer interruptions with their patients. In addition, each student is paired with a Longitudinal Preceptor for Medicine who meets with a small group of students weekly to review clinical cases, skills and personal and professional issues.

During Neurology, students gain a solid foundation in the neurological exam, the interpretation and significance of exam findings and the major neurological disorders and syndromes. Educational experiences include inpatient as well as outpatient rotations and a core curriculum to supplement clinical experiences. Students gain exposure to neurologic procedures such as the lumbar puncture through hands-on training in our simulation center. Educational experiences are supplemented through case-based sessions with expert clinicians and nationally developed curricular resources. The Internal Medicine and Neurology experiences are closely related to take advantage of overlapping patient care experiences, knowledge and skills required for the care of adults.

Pediatrics allows students to participate in the care of infants, children and adolescents in the ambulatory, inpatient and nursery settings. Students become familiar with primary care and subspecialty pediatrics and the important role of the pediatrician in children's physical and emotional development. They acquire basic knowledge of normal growth and development as well as common pediatric acute and chronic illnesses. In the ambulatory component of the curriculum, students are members of a health care team in a community-based office, supplemented with experiences in the pediatric emergency department, newborn nursery and patient home visits. During the inpatient component, students rotate in an acute care hospital, caring for hospitalized children. Students develop competency in the physical examination of infants, children and adolescents; acquire an understanding of the influence of family, community and society on a child's health; and develop strategies for health promotion. Throughout the Pediatrics clinical curriculum,

students actively participate in the health care of pediatric patients and their families, developing and refining their communication and interviewing skills and clinical problemsolving skills. All conferences are in a Case Method Teaching format, facilitating student-preceptor discussion, critical thinking and development of problem-solving skills. The experience is supplemented by a computer-based learning program that allows students to participate in the care of interactive virtual patient cases designed to cover areas of the core curriculum.

Clinical experiences with faculty from the Department of Family Medicine & Community Health give students broad exposure to the principles and practice of Family Medicine. Students work one-onone with an assigned community-based faculty preceptor, seeing and following patients in the office setting. This format provides students with a continuity-of-care experience, in which the health care needs of patients and their families are managed over time. An innovative curriculum based on the virtual "McQ" family is conducted at the Medical School, where students work in small groups to manage the health care needs of this simulated three-generation family. Core curricular objectives include prenatal care management; common childhood illness; adolescent issues: health maintenance and disease prevention across diverse age groups; and evidence-driven management of common diseases encountered in the ambulatory setting. Additionally, students participate in online curriculum programs as well as hands-on curriculum in evidencebased medicine.

Students undertaking their **Psychiatry** clinical experience develop the interviewing, reasoning and communications skills fundamental to psychiatric diagnosis and intervention. An integrative model emphasizes the biologic, psychodynamic, social and behavioral aspects of treatment. Students learn about diagnosis and treatment of common psychiatric disorders and develop an appreciation for the unique factors that influence presentation, treatment response and prognosis. Students also learn about the role of the psychiatrist and other mental health disciplines in the care of

persons with mental illness, how to work as part of a health care team and when and how to refer patients for mental health services. All students are given opportunities to see patients in hospital-based and ambulatory settings. UMass Memorial has a state-ofthe-art emergency mental health facility, where students can observe evaluations of adults and children in crisis. The Psychiatry core curriculum includes case-based teaching sessions, videotapes, role play with standardized patients and new audience response technology. All students are given the opportunity to observe electroconvulsive therapy. A one-week enrichment elective is available where students can rotate on a unique psychiatric inpatient service for developmentally disabled adults.

Pediatrics, Family Medicine and Psychiatry clinical experiences are closely coordinated to help present the overlapping competencies required for the care of families.

Obstetrics & Gynecology provides students with clinical experiences in women's health care in inpatient and ambulatory settings, located at large tertiary referral centers and smaller community hospitals. Formal didactic and clinical sessions are interwoven to help students develop interviewing, physical examination and diagnostic and management planning skills. The OB/GYN clinical curriculum focuses on a variety of areas related to women's health across the life cycle, including family planning; prenatal care; normal and abnormal labor management; gynecologic surgery; cancer screening and treatment; menopausal issues; and assessment and management of pain, infection and bleeding. Additional content includes explorations of legal and ethical issues related to women's health care; topics in lesbian, bisexual and transgender health: and a basic science-clinical correlation in reproductive endocrinology.

During their **Surgery** training, students learn a broad base of fundamental skills and clinical knowledge pertaining to general surgery and the surgical specialties. The Surgery experience includes a variety of venues, with rotations in the traditional surgical disciplines as well as the subspecialties. Clinical experiences are enriched by a core curriculum that includes

lectures with case discussions, standardized patient cases and practice in basic surgical techniques. In addition to seeing patients in the hospital, emergency rooms and clinics, students attend conferences and participate in small group discussions utilizing the case study method of teaching. In the UMMS Simulation Center, special sessions are offered on fundamental technical skills such as intravenous access, management of the patient with small bowel obstruction and relevant human factors issues (including surgical decision making, communicating empathy and caring, oral presentations and time management). All students participate in the Trauma Evaluation and Management Program sponsored by the American College of Surgeons as well as a day-long session dedicated to surgical imaging. A website provides links to multiple resources, including interactive case-based exercises that enhance student learning.

Obstetrics & Gynecology and Surgery clerkships work together to emphasize key operative competencies and diagnostic and clinical skills in perioperative and maternal care.

As described above, one-week Flexible Clinical Experiences (FCE) are offered to CCE students in order to provide opportunities for individual exploration for students in a variety of clinical and translational fields early in a student's career. The program allows for self-directed learning by providing a diverse offering of pre-designed experiences and allowing students to propose one of their own creation. Students complete four weeks of FCE during their core clinical year. This early selective experience fosters mentoring, nurtures and develops early interest in clinical specialties not included in traditional clerkship training and allows students to forge their own pathway.

A longitudinal curriculum, called the **Interstitial Curriculum** supplements the learning in these core disciplines and addresses topics that cross over care throughout the Core Clinical Experiences. The innovative Interstitial Curriculum addresses important contemporary issues and areas of need in our curriculum as identified by faculty and curriculum committees. The diverse Interstitial Curriculum comprehensively

addresses medical and societal dimensions of health care in a wide range of topics, including domestic violence, geriatrics, disabilities, end-of-life care, multiculturalism, medical error/patient safety, oral health, pain management, and health care policy and the practice of medicine. The program is led by a pair of faculty that includes a basic scientist and an educator, who are aided by a team of faculty and multidisciplinary professionals to address educational objectives from basic and clinical sciences as well as psychosocial, legal, ethical and societal perspectives. A broad range of educational formats is used to promote active learning and interdisciplinary teaching. A typical Interstitial Curriculum day is taught by as many as 40 medical school and community faculty and includes plenary sessions, classroom teaching, small group workshops, expert panels, films and interactions with standardized and real patients. Some incorporate interprofessional learning with colleagues from the Graduate School of Nursing. Each Interstitial Curriculum session emphasizes specific advocacy issues and highlights local and national resources to enhance students' abilities to advocate for their patients and communities. These days also serve as the major curricular component of the Doctoring and Clinical Skills course and Learning Communities during the Core Clinical Experiences, and integrate a variety of journal club experiences as well as a specific smallgroup interprofessional curriculum co-taught with faculty from nursing, pharmacology, medicine and behavioral sciences and with students from multiple professional training programs aimed at communication skills and teamwork. Students are required to attend all scheduled Interstitial Curriculum sessions and receive a credit grade for each one on their transcripts.

Each element of the Core Clinical
Experiences integrates appropriate basic
molecular, genetic and biomedical sciences.
This model takes advantage of rich resources
in cutting-edge biomedical research at
UMMS, links to students' foundational
studies experiences, promotes critical
thinking and maintains scientific inquiry as
an important element of clinical medical
education and practice.

Upon completion of the Core Clinical Experiences, all students must pass the Comprehensive Core Clinical Assessment, which evaluates student performance in the essential clinical skills and competency areas covered in the core disciplines. This is a comprehensive performance-based assessment consisting of multiple clinical cases using standardized patients as well as other methods, such as computer-based and mannequin-based case simulations, X-ray interpretation and physical exam models.

Advanced Studies

Advanced Studies begin in the spring of the third academic year, following completion of the Core Clinical Experiences. This curriculum balances required and elective time to support students' personal and professional development. The required elements currently include the Subinternship, an Advanced Biomedical and Translational Sciences elective, an Emergency Clinical Problem Solver course and the Capstone Scholarship and Discovery course. The remainder of curriculum time is allocated to at least 20 weeks of electives.

The required **Subinternship** is designed to allow students the experience of managing patient care on an acute care hospital service under direct supervision of residents and attending physicians or hospitalists. These required rotations are offered in approved specialties that currently include Internal Medicine, Family Medicine, Acute Care Surgery and Pediatrics. Rotations have been standardized to ensure comparable experiences with different patient populations. The roles and responsibilities of subinterns mirror that of interns as closely as possible. Duties include patient admission; initial evaluation and subsequent coordination of care; daily ward rounds and discharge planning; communication with primary care providers, consultants, patients and family members; necessary procedures and coordination of discharge. Subinterns attend team and resident educational meetings and participate in a case-based curriculum that focuses on higher level practice-based skills. Some of these rotations include membership on a team with residents and interns, while others pair students directly with hospitalist faculty.

New required curricular elements during Advanced Studies include Advanced Biomedical and Translational Sciences. Capstone Scholarship & Discovery and **Emergency Clinical Problem Solver** experiences. The goal of the Advanced **Biomedical and Translational Sciences** experiences is to allow students to select from a number of courses that emphasize frontiers in biomedical sciences in a field of interest relevant to students' interest, preferences and career path. The Capstone Scholarship and Discovery course is designed to train students as future physicians, in the principles of scholarship, research methods and scientific inquiry, so that all students will have an opportunity for a mentored scholarly project on a topic of choice and under the guidance of a faculty member. The program asks students to identify their chosen topic from a broad range of options, including basic, clinical or behavioral sciences, and apply principles of research and scholarship to examine, collect and analyze information and develop

a formal presentation worthy of peer-review. Students are mentored through this work, which builds on the four-year curriculum. **The Emergency Clinical Problem Solver** course is a combination of simulation, problem solving and clinical experiences in emergency and urgent care settings. This course serves as a culmination of clinical experiences, reinforcing students' problem-solving skills and confidence in key clinical scenarios as they prepare for the next phase of their training in internship.

For the remainder of the Advanced Studies year, students undertake a planned program of study consisting of 20 weeks of elective experiences. With the guidance of Learning Community mentors and specialty advisors, students develop an individualized and balanced elective schedule that includes rotations appropriate to their field of interest, work in both basic science and clinical medicine and experiences in preparation for internship. Fourth-year elective opportunities are available in diverse areas of interest, such as the medical and surgical subspecialties, community-based experiences at public health agencies and community health centers, rotations sponsored by other U.S.

medical schools, experiences abroad through our International Medical Education Program and research in the clinical or basic sciences. As many as 30 percent of fourth-year students elect to participate in the Senior Scholars Program, which offers up to three months of supervised research experience under the sponsorship of a research faculty mentor. Students who participate in the Senior Scholars Program do not need to complete an additional capstone project.

The Advanced Studies year culminates in a **Transition to Internship** that offers students a choice of targeted curricula in areas relevant to their chosen field, including practicing relevant procedures in the interprofessional Center for Experiential Learning and Simulation, response to oncall urgencies and emergencies, laboratory medicine reviews, transitions of care and sign-out, and advanced cardiac/trauma/pediatric life support.

A passing score on USMLE Step 2 Clinical Skills (CS) and Clinical Knowledge (CK) exams will be required for graduation from the School of Medicine. Students are advised to complete both USMLE Step 2 exams before December of their final year.



Final phase of new curriculum approved

A milestone was quietly reached in February 2012 when the Educational Policy Committee unanimously approved the final phase of the new School of Medicine curriculum, symbolizing the culmination of years of careful work by more than 500 members of the UMass Medical School community.

When the process of redesigning the curriculum began in 2004, the goal was beyond ambitious: to completely re-imagine medical education from top to bottom with involvement from as many stakeholders as possible, from first-year students to senior staff.

The resulting Learner-centered Integrated Curriculum, or LInC, incorporates innovations in teaching and learning as well as the latest national standards for medical education, and is designed to address the six competencies required of all School of Medicine graduates: physician as professional, scientist, communicator, clinical problem solver, patient and community advocate, and person.

The newly approved fourth-year curriculum, called Advanced Studies, begins in May 2014. In addition to the 20 elective weeks, Sub-Internship and the Transition to Internship program requirements in the fourth year, three new courses have been created: Emergency Clinical Problem Solver, Advanced Biomedical and Translational Sciences and the Capstone course.





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Additional Degree Programs

MD/PhD Program

For students planning a career as a physicianscientist, the MD/PhD Program represents an integrated pathway for training in biomedical or population health sciences research and medicine. The program integrates the curriculums of the School of Medicine and the Graduate School of Biomedical Sciences (GSBS) to provide a structured foundation of diverse topics with the flexibility necessary to meet the needs of the individual student. Students in the UMMS MD/PhD program have the option to select research training in biomedical sciences or in clinical population health sciences. The expected outcome is the education of talented students for a career as physician-scientists prepared to make significant contributions to health care and to become the leaders in academic medicine.

Curriculum

The first two years of the program are based in the School of Medicine. MD/PhD students start with a research rotation in the summer prior to the first year of medical school. Students have the opportunity to select a laboratory rotation with one of our many graduate training faculty. Between first and second year of medical school, students experience full-time lab rotations with the goal of identifying a thesis advisor. In addition to the traditional School of Medicine curriculum, MD/PhD students participate in an MD/PhD-specific course throughout the first two years of

medical school; this class is taught by research faculty of the Graduate School of Biomedical Sciences and provides basics of the GSBS curriculum with topics that are coordinated with the medical school curriculum to enhance integration between medical knowledge and research advances.

After completion of the second year of medical school, and Step One of the Boards, MD/PhD students complete one 16-week block of the core clerkships before starting graduate studies. This clinical experience with an ongoing clinical tutorial helps to solidify and maintain clinical skills during the thesis research years. Students are expected to complete their qualifying exams within three to six months of starting research. Members of the Qualifying Committee will be chosen from members of that graduate school most qualified to ensure oversight of the student's academic development in the selected area of thesis research. The students spend the next three or four years performing research and working on their thesis project.

The Thesis Research Advisory Committee, which in many cases is the same as the Qualifying Committee, evaluates the student's progress in research biannually and convenes when the student has written their thesis for the defense. The MD/PhD program integrates clinical education and preparation for return to medical school throughout the graduate years. During each term (fall, spring and summer) of the graduate school years, students participate

in a self-selected clinical tutorial (minimum of 10 hours per semester). Students can round on the ward services with a member of the clinical faculty (usually a physician-scientist), attend an outpatient clinic or participate in supervised freestanding clinics in the area. Longitudinal training in clinical and doctoring skills is also provided through the mentors in the Learning Communities. After the thesis has been written, defended and the final copies submitted to the Office of Graduate Studies, the last two years of the typical program are spent completing the clinical curriculum of medical school. Students enrolled in the program can return to medical school at several points in the academic year depending on their curricular needs and previous schedule choices.

A monthly student seminar is held for all students enrolled in the program. Advanced graduate students of the program present their research to the group and receive feedback on their presentation.

Eligibility

Residents and non-residents of Massachusetts are eligible for admission to the MD/PhD Program through the Graduate School of Biomedical Sciences and the School of Medicine.

Financial Support, Tuition and Fees

Tuition is waived and fees are set forth in the general schedule. Out-of-state PhD/MD students are subject to the non-resident annual Special Program Fee for each year of enrollment in the School of Medicine prior to completion of the PhD degree. The enrollment fee for years one and two may be different than years three and four of medical school enrollment prior to completion of the PhD degree.

Massachusetts residents are subject to an annual in-state Special Program Fee for each year of enrollment in the School of Medicine prior to completion of the PhD degree. The Special Program Fee is deferred and forgiven in full with the successful completion of the PhD and MD degrees. Students are eligible for graduate student stipends and health and disability insurance throughout the program.

Application Procedures

Candidates for the MD/PhD Program begin the application process by submitting an application to the School of Medicine through the American Medical College Application Service (AMCAS). After receipt of the AMCAS application, candidates will be sent an online link to a supplementary UMass Medical School application. Only the MCAT is required for application. Additional information about the program is available by contacting <code>phdmd@umassmed.edu</code>.

Master of Public Health Program

A Master of Public Health (MPH) degree is offered at UMMS and granted through and accredited by the School of Public Health and Health Sciences at the University of Massachusetts in Amherst. The courses are taught in Worcester by faculty from both campuses.

The curriculum for the MPH Program is designed to enable health care professionals to earn this advanced degree while engaged in professional activities. Classes are scheduled in the early evening to accommodate working students. The courses cover a wide variety of subjects in the fields of epidemiology, biostatistics, health policy and administration, research methods, managed care, program planning, environmental health and data management.

The requirements for the degree include a total of 42 credits. This may include an optional MPH Project for three or six credits. All MPH students are required to complete a three-credit practice experience as a degree requirement. However, a student can petition for a waiver for the practice requirement based on previous, documented experience. All students, including those who receive this waiver, must complete 42 credits. For more information on the practicum requirement, please see: http://www.umass.edu/sphhs/MPHPracticumStudentHandbook_000.htm

A typical student can complete the MPH program in two to four years and can accelerate completion by taking courses on the Amherst campus or through the Public Health Practice online program. Students who do not wish to pursue the degree may take courses in the program on a non-degree basis.

Master of Science in Clinical Investigation

The Master of Science in Clinical Investigation (MSCI) program emphasizes the development of strong clinical investigation skills based on a solid foundation in study design, conduct of observational studies and randomized trials, clinical epidemiology and biostatistics. Students will also acquire excellent writing and oral presentation skills through formal classroom work.

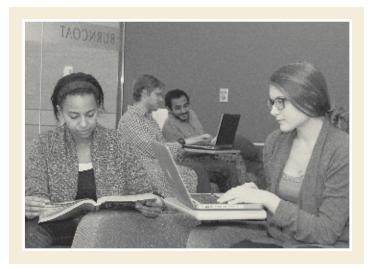
Trainees completing the MSCI Program will acquire the necessary skills to successfully design, conduct and analyze the results of clinical investigations at the individual and population-wide level as well as design and analyze the results of studies that provide insights into the molecular pathophysiology of disease.

Trainees are grounded in the principles of clinical investigation with a flexible multidisciplinary focus, providing a curriculum tailored to their needs and interests as young researchers aspiring to become successful independent clinical investigators.

The MSCI Program offers two concentration tracks: population-based clinical research and bench-to-bedside translational research. These concentrations allow students to enhance their knowledge based on their current interests and career objectives. The participating faculty—representing the interdisciplinary nature of the MSCI Program—come from the disciplines of epidemiology, biostatistics, clinical research, biomedical informatics and molecular medicine.

Requirements

Candidates for the MSCI degree should have a medical or nursing degree or a PhD in the social, physical or biological sciences. While no minimum grade point average is required for entry into the program, students applying for admission must have demonstrated superior academic performance and have prior research experience. A master's degree in clinical investigation is also available to UMMS medical students who are accepted and enroll in the Clinical/Translational Research Pathway Program. This opportunity builds on the Pathway core requirements and includes an additional "pull-out" year to allow for enrollment in the MCSI in the Graduate School of Biomedical Sciences. Candidates for this program option must be in their second or third year of medical school and officially enrolled in the Clinical/Translational Research Pathway program.



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Student and Academic Resources and School Services

Student Resources

Office of Student Affairs

The Office of Student Affairs provides advocacy for and support to medical students in pursuing their major role, which is to learn both the science and the art of medicine. Medicine is one of the most interesting, rewarding and complex professions to enter. The office helps medical students to develop into empathic, compassionate, knowledgeable physicians who have a lifelong enthusiasm for their profession and who reflect the goals and ideals set forth in the mission statement for UMass Medical School.

Student Affairs strives to be a supportive and responsive place where students can find help in coping with the academic and personal demands of medical school. The Associate Dean for Student Affairs shares these roles with the assistant deans for Advising and Diversity, faculty members, Learning Communities mentors/advisors and the Student Counseling Service. The office seeks to be sensitive to the needs of all majority and minority students, including married students; students challenged by learning, physical, emotional or economic issues; students who are parents or who have had prior careers or advanced degrees; gay, lesbian, bisexual and transgendered students; and all students in our educational community from diverse cultural, ethnic, racial, socio-economic and linguistic backgrounds.

Student Affairs also provides support for a variety of student activities, such as administration of the National Residency Matching Program (NRMP), Electronic Residency Application Service (ERAS),
Medical Student Performance Evaluation
(MSPE)/Deans' letters, orientations,
commencement and graduation, the Basic
Science and Clinical Science Academic
Evaluation Boards, student-run groups/
organizations (see list on page 23) and the
Student Body Committee. In these roles,
Student Affairs acts as an advisor both to
students and faculty to help facilitate and
carry out timely and informed decisions.

Student Affairs jointly administers the SOM Learning Communities Program with the Office of Undergraduate Medical Education. Learning Communities are designed to enhance the quality of student-teacher and student-student relationships by developing longitudinal interactions between students, faculty and peers from other classes throughout the four-year educational program. This model improves continuity of teaching doctoring and clinical skills, supports interactive and small group teaching, fosters students' self-directed learning and develops students' skills in formal and informal peer teaching and mentoring.

Student Affairs also works closely with the Office of Undergraduate Medical Education, which shares administrative responsibility for the undergraduate medical curriculum with the Educational Policy Committee of the Medical School faculty, with the Office of Graduate Medical Education and training directors, and with the UMMS Office of Educational Affairs. These associations with the larger educational effort of the Medical School encourage the interdigitation of support, curriculum and educational issues in medical student education.

Student Affairs, Diversity

The Office of Student Affairs, Diversity strives to create an atmosphere and institutional culture that is welcoming to all medical students, inclusive of their race, ethnicity, religion, spirituality, gender, gender identity/expression, age, sexual orientation, ability/disability, socioeconomic class and national origin. With a special focus on underrepresented groups in medicine (URM), the office works to provide academic and professional support and assist with work-life integration of medical students. The

support includes advice and assistance with academic advancement, mentoring support and career counseling.

The Assistant Dean of Student Affairs and Diversity enhances the Medical School's commitment to the practice of cultural competency by working with Learning Community mentors to create an inclusive learning environment. The Assistant Dean provides advocacy for URM students and those from disadvantaged backgrounds at the Basic and Clinical Science Evaluation boards.

The Assistant Dean for Diversity works in collaboration with the Diversity and Equal Opportunity Office (DEOO) to coordinate representation from UMMS and active student involvement with professional organizations, especially those targeted to URM. URM students from underrepresented groups are encouraged and supported to regularly attend national and regional professional meetings. Upon return from these meetings, the Assistant Dean plans forums where students share their learning

Student Activities and Organizations

A number of activities and organizations take place or have been formed to reflect UMass Medical School students' commitment to a complete educational experience. Activities and organizations include the following:

- Access to Essential Medicine Group
- Adolescent Medicine Interest Group
- American Medical Student Association
- American Medical Women's Association
- American Sign Language Group
- Asian Community Outreach Organization
- Big Brothers/Big Sisters
- Center for Healthy Kids
- Christian Medical and Dental Association
- Complementary & Alternative Medicine Interest Group
- Dermatology Interest Group
- Disability Interest Group
- Emergency Medicine Interest Group
- · Epworth/St. Anne's Free Clinics
- Family Medicine Interest Group
- Flu Shots
- Food/clothing/gift drives
- Generalist Physician Program
- Geriatrics Interest Group
- Health Policy and Advocacy Interest Group
- · Health Professionals for Human Rights
- Hudson Free Clinic
- Internal Medicine Interest Group
- International Federation of Medical Students Association
- International Health Interest Group
- Jewish Medical Student Association
- Juvenile Health

- Know Your Status—Worcester
- Malaika Project
- Marrow for Tomorrow
- Massachusetts Medical Society
- Medical Interviewing in Spanish
- Medical Mission to the Dominican Republic
- Medical Students for Choice
- Mentoring Program at Lakeview Elementary School
- Mustard Seed
- OB/GYN Interest Group
- Ophthalmology Interest Group
- Patches of Love
- Pediatric Book Buddies
- Pediatric Interest Group
- Physicians for Human Rights
- · Physicians for Social Responsibility
- Psychiatry Interest Group
- QMass
- Radiology Interest Group
- · Serving the Underserved
- · Seven Hills Symphony
- Student Body Committee
- Student Interest Group in Neurology
- Student National Medical Association
- Surgery Interest Group
- UMass Outdoor Experience
- Well Being Newspaper

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and update the medical school community on best practices that can be adopted at UMMS.

In partnership with the DEOO, the office directs the Resident Recruitment Program for underrepresented groups, providing mentoring and networking support for medical students who participate in this program. The Office of Student Affairs, through the Assistant Dean, also provides support for URM residents in the Graduate Medical Education programs at UMass Memorial. This support consists of mentoring, career counseling and managing retention issues.

UMMS values the importance of diverse talents, backgrounds, viewpoints, experiences and interests in its academic learning community. In collaboration with DEOO, networking events with faculty, URM residents and students are held at least twice a year. These networking events establish professional and social ties between URM students and faculty. In addition, networking events assist URM students to identify and further mentoring relationships with faculty.

Student Mentoring/Career Counseling

Each entering UMMS student is assigned to a Learning Communities house that includes students across all four years of the educational program. Within each house, every student is assigned a personal Learning Community mentor who provides individualized guidance and mentorship on academic achievement, career guidance, professionalism, lifestyle and personal issues. The assignment typically remains in place until graduation. Copies of the student's evaluations, grade reports and other relevant materials and assessments are sent to the student's mentor to assure that mentors can provide timely, relevant and meaningful feedback, advice and support to their assigned students. Through the Learning Communities model, each student receives personalized, continuous support, from admission to UMass through graduation, by a designated faculty mentor.

Optional Enrichment Electives

- Adoption and Foster Care:
 Considerations for Medical Practice
- American Sign Language
- Basic Skills for Working with Smokers
- · Care of the Seriously III
- Clinical/Translational Research Pathway
- Complementary and Alternative Medicine
- Exercise Medicine
- Global Health Topics in Action
- History of Medicine
- · Maternal/Child Health
- Medical Creative Writing
- Medical Interviewing in Spanish
- Navigator Program in Geriatrics
- Pathway Program: Serving Underserved and Multicultural Populations
- Pediatric Advocacy
- Roads to Recovery: Substance
 Abuse from Patients' Perspective
- Rural Health Scholars
- Students as Educators
- Teen Pregnancy: Medical and Psychosocial Perspectives
- The Bigger Picture: Health Issues
 Affecting the Community of
 Worcester
- Understanding and Improving Our Health Care System
- Wilderness Medicine and Recreational Emergencies

Office of Undergraduate Medical Education

The Office of Undergraduate Medical Education (OUME)—a division of the Office of Educational Affairs—is the center for academic life at the School of Medicine, where students meet with faculty and peers, plan activities, develop ideas for curricular enhancement and innovation, and learn about the latest advances in

medical education, including research, technology and curriculum development. In essence, the OUME serves as the hub for the numerous spokes that represent UMMS undergraduate medical education, providing access to the resources needed for curriculum development, implementation and evaluation and ensuring a rich educational program of courses and electives throughout the four years of medical school. In addition to the programs mentioned above, the OUME sponsors community-based education, which provides support for hundreds of community-based preceptors and educational affiliates who enrich our students learning experiences.

The quality and diversity of our curricular programs reflect our educational model of collaboration with a broad range of partners, including students; campus and communitybased faculty; the leadership and guidance of the Educational Policy Committee (EPC) and its curriculum committees; UMMS offices, programs and departments; and educational affiliates based locally, regionally and statewide. The Medical School's resources in support of education are comprehensive and provide full-service support to all facets of the educational program, including curriculum development, faculty development, research and evaluation, academic computing, educational grants, state-of-the-art simulation equipment and our nationally recognized Standardized Patient Program, housed in iCELS.

Curricular Programs and Educational Resources

The Office of Undergraduate Medical Education (OUME) sponsors interdisciplinary courses across all four years of the curriculum. In the preclinical years, this includes Doctoring and Clinical Skills, a two-year, comprehensive introductory clinical skills course that integrates into the Interstitial Curriculum in year three. The OUME supports the innovative Interstitial Curriculum—a series of one-day interdisciplinary educational programs for Core Clinical Experiences students that address important contemporary issues in medicine through a cross-disciplinary model of teaching across the basic, clinical,

behavioral and social sciences. Interstitial Curriculum days combine classroom teaching, workshops and interactions with standardized and real patients. Topics include end-of-life care, pain management, multiculturalism, domestic violence, medical error/patient safety, geriatrics, health policy and the practice of medicine, oral health and disabilities. Many participants include faculty and learners from the Graduate School of Nursing. In addition, the OUME sponsors the Capstone Scholarship and Discovery course, a four-year integrated program that supports students' completion of scholarly work in a self-defined area of interest.

Supplementing and enriching the required curriculum, the OUME also sponsors an extensive menu of elective courses and programs, developed in partnership with faculty and students to meet the individualized learning needs and interests of our diverse student body. The OUME also sponsors Optional Enrichment Electives, providing a plethora of enrichment opportunities for credit across all four years in diverse areas of interest.

In partnership with the Office of Educational Affairs, the OUME supports the Integrated Geriatrics Curriculum, a four-year curriculum initiative funded through a grant from the Donald W. Reynolds Foundation, which supports the integration of teaching about geriatrics and aging throughout the medical school curriculum.

International Medical Education Program

This program adds a global dimension to the Medical School curriculum with the goal of developing students' linguistic and cultural competence; fostering understanding of and experiences in global health; providing opportunities for research and scholarship in global health settings; and promoting interest in serving underserved and multicultural patients both locally and abroad. Each year approximately 35 percent of clinical-year students and 35 percent of preclinical students choose to participate in a variety of school-sponsored international health programs and approved fourth-year electives in countries such as Guatemala, Honduras, Costa Rica, the Dominican Republic, Nicaragua, Ecuador, Brazil, India, Uganda, Zambia and South Africa. As part

of the International Medical Education Program offerings, interested students have an opportunity to pursue clinical and language programs abroad through the Iongitudinal Pathway on Serving Multicultural and Underserved Populations. Each year, a limited number of first-year students are selected through a formal application process into this pathway, which provides them with selected placements in curricular opportunities, including a preclinical Longitudinal Preceptorship Program with a physician serving underserved multicultural populations, an assignment to a local immigrant family, a summer abroad experience, the family medicine Core Clinical Experience in a site serving underserved cross-cultural populations, and international clinical electives emphasizing primary care.

Research Programs

Through the Clinical/Translational Research Pathway, the School of Medicine offers students the opportunity to participate in a longitudinal, structured program throughout the four years of the Medical School curriculum. A minimum of 10 first-year students are selected annually through a formal application process into this pathway, which provides them with an introduction to methods and concepts in clinical/translational research and a training platform in the basics of clinical/ translational research. A master's degree in clinical investigation is available to UMMS medical students who are accepted and enroll in the Clinical/Translational Research Pathway program. This opportunity builds on the pathway core requirements and includes an additional "pull-out" year to allow for enrollment in the master's degree in clinical investigation program in the Graduate School of Biomedical Sciences. Candidates for this program option must be in their second or third year of medical school and officially enrolled in the Clinical/Translational Research Pathway program.

In addition to the Clinical/Translational Research Pathway, all students have the opportunity to participate in two key elective programs: The Summer Research Fellowship Program provides first-year students with stipend support to participate in a biomedical or behavioral research project

working with a faculty mentor during the summer between FOM1 and FOM2. The Senior Scholars Program provides students with the opportunity to work one-on-one with an assigned faculty research mentor on a research project. Students have further opportunities for research through completion of their required scholarly project for the Capstone Scholarship and Discovery Course.

Service-Learning Programs

For students interested in servicelearning opportunities, the OUME sponsors programs in partnership with the Department of Family Medicine & Community Health. The Community Service Assistantship Program places students in agencies, community health centers and advocacy programs that serve diverse communities, with a particular focus on underserved populations in Massachusetts. During the summer vacation period, students receive up to eight weeks of stipend support for their community service work. In addition, students may elect to apply to the Albert Schweitzer Fellowship Program, which provides an opportunity to develop and implement a year-long community service project to meet the needs of underserved communities, working under the guidance of an assigned faculty mentor.

Other Support Services

In addition to direct sponsorship of required and elective courses and programs through the Office of Undergraduate Medical Education, the Medical School provides general support for curricular needs and enrichment through a wide range of services supporting scholarship, innovation and national recognition for our educational programs through the OUME and the UMMS Office of Educational Affairs.

Educational grants provide valuable resources to faculty and students for the advancement of teaching in a variety of subjects. Our most recent award is the Donald W. Reynolds Foundation Comprehensive Programs to Strengthen Physicians Training in Geriatrics (2009-2012), which will support the implementation of a



comprehensive geriatrics curriculum as a longitudinal theme across all four years of the Medical School's educational program. In the past 10 years, grant-funded initiatives have enhanced curriculum innovation in health communication, geriatric medicine, human sexuality, professionalism, pain management, substance abuse, complementary and alternative medicine and cultural competence.

Community-based education supports UMMS and educational affiliates in the recruitment, training and retention of community-based faculty, providing the infrastructure support needed to effectively create a "commonwealth as classroom" outreach effort, with quality clinical training experiences for our students in various community medical settings, such as outpatient offices, ambulatory care clinics and physician's offices.

The Division of Institutional Research, Evaluation and Assessment supports student assessment, curriculum evaluation and medical education research.

Center for Academic Achievement

The center is open to all students at UMMS. Services include academic counseling, tutoring and a series of learning seminars that focus on test-taking, reading, memorization, communication and synthesizing information. The director and staff of the center work with individual students to identify learning needs which can be met through tutorials designed with learning specialists, educational psychologists and graduate students. The academic achievement program at UMMS is oriented toward prevention of academic problems through systematic needs assessment, mobilization of resources and continuity of the support experience.

Standardized Patient and Medical Simulation Programs

The Standardized Patient Program (SPP) and the other simulation resources housed in iCELS provide UMMS students with state-of-the-art technology in support of the development, advancement and assessment of their clinical skills.

UMMS has long used patient simulation as an essential component of its academic and clinical training. Established in 1982, SPP provides evaluative and instructional services that have evolved into integral and mandatory components of medical education. Through the use of highly trained lay people who simulate medical conditions realistically and consistently, the SPP is renowned for its technologically advanced, culturally sensitive medical training and evaluation of students and health care providers from academic and clinical programs across New England. Our standardized patients number more than 100 and represent some of the best in the country.

The SPP reputation for excellence led to its selection as one of a handful of programs to serve as a pilot site for evaluating the National Board of Medical Examiners USMLE Step II Clinical Skills licensure exam. This standardized patient performance-based, clinical skills assessment measures clinical competency and, since 2004, has been a mandated component of the USMLE licensure exam. At UMMS, all required core clinical experiences in the third year include a required "end of clerkship" Standardized Patient Objective Structured Clinical Examination (OSCE) as well as a comprehensive clinical skills assessment at the end of the Core Clinical Experiences component of the curriculum. These assessments utilize standardized patients to evaluate student performance in the essential clinical skills and competency areas covered in the core clinical curriculum, providing a high level of preparation for the required Step II Clinical Skills licensure examination.

Electronic patient simulators offer a complementary opportunity for students to build skills, practice common medical procedures and sharpen their decision making. Simulation technology allows students to practice, in the safety of the classroom, the clinical skills that are essential for patient care in the real world. The iCELS provides a comprehensive array of simulation technology, centrally located in the new Sherman Center and easily accessible to all students. The iCELS is equipped with the full range of simulation technology,

including task-trainers, high-fidelity full-body mannequins and computers with screenbased, virtual simulation for interactive case scenarios, performance debriefing, procedure training and independent learning.

The Office of Educational Affairs and the Office of Undergraduate Medical Education are conveniently located in the student wing. The OUME shares a suite of offices with Student Affairs. Students are encouraged to interact with the staff and to participate in the continuous improvement of the Medical School's educational programs.

Educational Technology

Information Services (IS) provides the educational technology infrastructure in support of teaching and learning including email accounts, network storage and desktop software packages. Academic Computing Services (ACS), a division of IS, collaborates closely with faculty, staff and students to evaluate, acquire, implement and support educational technologies for the Medical School. The division offers a number of strategic tools and services reinforcing an active virtual classroom, including:

- Learning Management System: UMMS
 currently is moving to BlackBoard Learn
 to host all Medical School courses, and
 ACS provides support and training for the development and delivery of courses in the Learning Management System.
- Laptop Program: Beginning in 2010, the School of Medicine instituted a certified laptop requirement to support student learning within and outside of the classroom. The laptops serve as the portal for student access to electronic course materials and engagement in technologybased classroom teaching. The program will continue to emphasize the baseline laptop requirement as it moves to a Bring Your Own Device model.
- E*Value: The implementation currently in process includes a web-based evaluation system with real time reporting for faculty and students; a detailed map of the content and methodology of the curriculum; a calendar view of all scheduled curriculum events; and an educational digital portfolio.

- Digital Lecture Capture: A majority of School of Medicine lectures are captured and available to students for review on the Web and via audio podcast.
- Virtual Microscopy: A virtual microscope technology enables students to view and manipulate digitized microscope slides 24/7 via the web.
- Audience Response System: Virtual polling via laptops, smart phones and tablets provide real time teaching and learning touch points.
- UMEDS: The UMass Medical Encounter
 Documentation System is a mobile web-based system used by students to record
 clinical patient encounters. This technology
 will be replaced by E*Value's clinical log
 tool in Academic Year '13-14.

Office of Bioethics

The Center for Bioethics works closely with the School of Medicine's curriculum and faculty to foster an environment in which all members of the UMMS community are encouraged to recognize the values embedded in human interactions and to develop the skills necessary to respond appropriately. The office is committed to providing high quality ethical consultation and educational programming. The primary goal of an integrated curriculum in ethics is for students to build the skills required to recognize and respond to the ethical issues that arise in their professional work. The office provides support for a variety of opportunities to practice these skills, beginning with sessions during the firstyear orientation, continuing throughout the Doctoring and Clinical Skills course during the foundational studies years and culminating with conference sessions in the Core Clinical Experiences curriculum.

Lamar Soutter Library

The Lamar Soutter Library is the physical and virtual center for information resources at the Medical School. These resources include access to more than 5,000 online journals as well as access to major biomedical electronic databases and to a comprehensive collection of both print and electronic books. In addition to standard medical resources, the Lamar Soutter Library also houses a Humanities in Medicine collection, a Women in Medicine collection and a History of Medicine collection as well as rare books and the archives of the institution.

Members of the library staff are intricately immersed in the curriculum of the school, supporting student's knowledge of utilizing and analyzing highest quality medical information. Instruction offered by the library includes the use of online bibliographic management tools, seminars in Evidence-Based Medicine and workshops in effective ways to locate and retrieve resources needed for both scientific and clinical work.



Learning Communities establish roots in the Sherman Center

When a handful of medical students and faculty members began to advocate for the incorporation of learning communities in the School of Medicine curriculum way back near the beginning of a decade-long redesign process, not much thought was given to what kind of space these communities might someday occupy. These advocates just wanted to make sure that learning communities as a vital part of the medical education process were given a chance. Now, with the opening of the Albert Sherman Center (ASC), the learning communities will come into their own in beautiful, light-filled spaces where all students can learn, teach, relax and recharge.

Informally established in 2008 and formally launched with the new Learner-centered Integrated Curriculum (LInC) in 2010, the five Learning Communities have become the foundation for both medical student life and the curriculum. They are designed to promote curricular continuity, foster cross-class interactions among students and to strengthen student-mentor relationships.

The new Learning Community suites in the ASC—clustered together across two floors—each include three small group meeting rooms with the flexibility to accommodate different courses' learning needs; a kitchen/lounge area where students can hold social functions or just gather to relax and grab a bite to eat; and an office area that brings mentors into the heart of the learning communities.

The five Learning Community suites are adjacent to the fitness center and the interprofessional Center for Experiential Learning and Simulation, as well as a learning space for the Graduate School of Nursing. Nearby is an auditorium that can accommodate a larger group than any existing space on campus can. Technology will link the new learning spaces in the ASC with the recently renovated spaces in the Medical School Building, including the Integrated Teaching and Learning Center and the state-of-the-art anatomy labs.



The library's computer area includes more than 100 workstations for access to word processing and spreadsheets and for access to the library's electronic resources via the internet. The library's electronic resources are available off-campus to UMMS students and faculty via proxy.

The Lamar Soutter Library is one of eight regional resource libraries affiliated with the National Library of Medicine. In addition, the library participates in a number of consortial agreements that greatly expand the availability of resources for students. The library also takes an active role in community information outreach in our role as the only public medical library in Massachusetts and serves as the library for the school's clinical partner, UMass Memorial Health Care. Plus, as the library is centrally located on the Medical School campus, it serves as a gathering place for cultural activities such as employee and student art exhibits, book readings and guest lectures.

School Services

Office of School Services

The office serves students in the three schools of the UMMS campus and is responsible for matriculation services and pre-matriculation programs. Matriculation services include Financial Aid, Registrar/ Student Records, Student ADA Support and Weather Watch. Pre-matriculation programs include outreach programs for minority and disadvantaged students (High School Health Careers Program and the Summer Enrichment Program), the Worcester Pipeline Collaborative, the Regional Science Resource Center and the Undergraduate Summer Research Fellowship Program, For more information, visit: http://www.umassmed. edu/summer/index.aspx

Accommodations for Students Under the Americans with Disabilities Act

According to the Americans with Disabilities Act (ADA), a disability is defined as an impairment that substantially limits one or more of the major life activities of an individual; a record of such an impairment; or, the perception that one has such an impairment. UMMS is firmly committed to providing full access to individuals with disabilities. In so doing, UMMS intends to fully comply with the Americans with Disabilities Act (ADA) of 1990 and Equal **Employment Opportunity Commission** guidelines. Students who avail themselves of the ADA will not be treated with prejudice or adversity. The Office of School Services, working in collaboration with the Diversity and Equal Opportunity Office, coordinates all student disability issues.

The Vice Provost for School Services serves as the ADA Student Coordinator. Once admitted, the student is responsible for notifying the ADA Student Coordinator of his/her disability, requesting academic accommodations in writing and providing appropriate documentation of the disability.



A student may request accommodations at any time during matriculation. All requests for accommodations are reviewed and acted on by the Academic Accommodations Committee. It is always the student's choice whether or not to accept any recommended accommodation. Confidentiality is a strict practice of the Academic Accommodations Committee. Students may be referred to the Academic Accommodations Committee by course coordinators or Academic Evaluation Boards for analysis of the academic difficulty and its possible relationship to a disability. All students are expected to satisfy the Technical Standards of the Medical School. Accommodation under ADA will not be in conflict with the fundamental nature of the academic programs of UMMS. For more information, visit: http://www.umassmed. edu/schoolservices/ada.aspx

Appropriate Treatment of Students

In 2001, UMMS developed a policy and complaint procedure to help ensure the appropriate treatment of students (ATS) in the School of Medicine, Graduate School of Biomedical Sciences and Graduate School of Nursing. Students should expect to be treated with respect and to learn and work in a safe and nurturing environment. All individuals who interact with students are expected to behave in accordance with the ATS policy, which applies to faculty, administrators, nurses, house staff, postdoctoral students, technicians, other learners, and other volunteer or paid staff. Inappropriate treatment occurs when behavior shows disrespect for the dignity of others and unreasonably interferes with the learning process. It can take the form of physical punishment or threat, sexual harassment, psychological cruelty, and discrimination based on race, color, national origin, religion, gender, sexual orientation, age, disability or veteran status. Please note that separate school-wide policies are in place covering sexual harassment, consensual amorous relationships and discrimination based on protected-class status.

For more information, including definitions, policies and procedures for reporting suspected inappropriate treatment, students are encouraged

to contact the Office of Undergraduate Medical Education or the Diversity and Equal Opportunity Office. The policy and procedure is also available in the Office of Student Affairs. The DEOO is responsible for coordination and monitoring of all ATS complaints, for training faculty members to serve as resource persons for students with ATS-related inquiries and concerns, and for ongoing oversight and periodic review of the training process.

Student Counseling Service

The Student Counseling Service (SCS) provides counseling, psychotherapy, assistance with stress management, and educational programs on emotional well-being for students. Students come to SCS seeking personal growth and greater self-understanding as well as healthier psychological functioning. Many students using the service want to cope more effectively with difficult or stressful academic situations, while others seek counseling to deal with broader life issues. Some students come because of more serious, troublesome and/or chronic difficulties in their lives. The SCS maintains strict standards of privacy and confidentiality. The service cost is covered by the prepaid Student Health Plan fee.

Student Health Service and Student Health Plan

The Student Health Service (SHS) seeks to preserve and maintain the health of the students while at UMMS by providing upto-date health screening programs as well providing routine health care for many of the students. SHS maintains a dedicated website for all student health issues, including information on blood-borne pathogen exposures, insurance plans, upcoming flu or TST clinics, and all SHS policies as well as access to all health clearance forms. The SHS is located in a building adjacent to the Medical School and hospital. Students may choose a primary care provider at SHS or off campus, including their current provider with approval of the SHS Director. Hours of operation are 8 a.m. to 5 p.m. Monday-Friday with 24/7 coverage through the hospital's emergency room.

The University of Massachusetts School of Medicine does not currently require screening of students for blood-borne pathogens. Students who are aware that they are infected with or are carriers of a bloodborne pathogen [including but not limited to hepatitis B virus, hepatitis C virus and human immunodeficiency virus (HIV)] are strongly urged to contact the Health Service so that appropriate treatment, both medical and psychological, may be instituted or continued. As stated in the UMass School of Medicine's Technical Standards, infection, or carrier states, with certain blood-borne pathogens, may "restrict the student's ability to perform fully in some clinical clerkships and to meet the requirements of some specialties; therefore, the student will possibly be prohibited from future training and practicing in those fields." The Vice Provost for School Services/ADA coordinator oversees the process for all accommodations, including blood-borne pathogens, and all medical information is treated with strict confidentiality. As also stated in the Technical Standards, "other conditions that carry a high likelihood of debilitating student illness or that are likely to lead to a compromise of the student's immune system should be carefully considered before committing to a career in clinical medicine."

The UMass School of Medicine guidelines for medical students infected with a blood-borne pathogen can be found at www. umassmed.edu/SOM/BloodBornePath.aspx. These guidelines apply to all matriculated and visiting students.

In addition to following the UMMS
Policy on Students with Blood-Borne
Pathogen Infection, infected students on
clinical rotations are also subject to the
institutional blood-borne pathogen disease
policies as are physicians and nurses at
those sites to which students are assigned.

The Student Health Plan (SHP) is the administrative entity funded by the mandatory student health fee, providing routine primary health care coverage to students under the direction of physicians or nurse practitioners. With an additional fee, students may elect to have their immediate family members (i.e., spouse, children) covered under the SHP. Students are covered by the SHP during their period of enrollment,



from registration though August 31 of the following school year. A brochure describing the plan and its services is available through the SHS.

UMMS requires all students to carry supplemental insurance to cover specialty consultations, diagnostic evaluations and inpatient services. Such a policy may be purchased either through the UMMS or privately.

Students are required to carry disability insurance. A policy is available through the school, which is paid for by student fees. Benefits begin after 90 consecutive days of disability and include coverage for blood-borne pathogens. Upon completion of medical school, the coverage is portable to a residency and then to medical practice at the option of the graduate. Details of the policy are available online at www. medplusadvantage.com

Food Services

Cafeteria and dining areas are located on the first floor of the Albert Sherman Center and on the first floor of UMass Memorial Medical Center-University Campus, which is contiguous to the Medical School building. Both cafeterias offer a variety of selections, including a salad bar, deli bar, grill, soups, entrees, snacks, pastries and beverages. Food kiosks are also available in the Medical School building and the Lazare Medical Research Building.

Campus Bookstore

Located in the UMMS lobby, the campus bookstore is open Monday through Friday from 7:45 a.m.-4 p.m. for students, faculty, staff and the general public. The bookstore offers all required text and reference books (at a 5 percent discount with no tax charged) for the School of Medicine, Graduate School of Biomedical Sciences and Graduate School of Nursing. Books not in stock may be ordered through the store or via the UMMS website at http://www.umassmed.edu/ bookstore/index.aspx. Trade books, school clothing, school insignia items, medical instruments, school supplies, magazines and a variety of snack foods are also available. UPS shipping services are also available through the bookstore.

Housing and Transportation

School of Medicine students reside in the local community or commute, as housing facilities are not available on campus. Bus transportation to the campus is available via several routes. Those who wish to park on campus are required to register with the Office of Public Safety and pay an annual parking fee. While public transportation is generally available within the local Worcester area, educational sites for the Longitudinal Preceptorship program and Core Clinical Experiences are generally dispersed across Worcester County and neighboring towns to the north, south and west, within an hour's drive from the Medical School, requiring transportation by car. Students are expected to provide their own transportation to any assigned site. Given the breadth of our community-based teaching affiliates, students should be prepared to travel as far as Boston or western Massachusetts for certain rotations.

Academic Policies and Procedures

Advanced Placement

In consideration of the varied backgrounds of students and to allow some flexibility in programming, there are courses in which students may apply for advanced standing. Given our integrated model for courses and curricular framework, requests for advanced standing will be considered on a case by case basis. Under the oversight of the associate dean for undergraduate medical education, requests for advanced standing in a given course or course component will be reviewed by the respective curriculum committee and subject to approval by the designated course co-leaders.

Grading System

The faculty believes that a system of periodic evaluation is essential to enable students to identify their strengths and deficiencies and to permit instructors to evaluate student progress and their own teaching efforts. It is the intent of the faculty that all students successfully complete their course of study. Early on, through frequent and personal contact

with students, faculty members identify any difficulty a student may have in their coursework.

All FOM1. FOM2 and Advanced Studies courses (with the exception of required sub-internships) are graded on a basis of Credit/No Credit. A low passing grade of Credit/Marginal ("internal marginal") is also retained, if appropriate, for internal tracking purposes. For courses with appropriate structure, a written narrative is included as part of the final course grade. For Core Clinical Experiences and electives, the ratings given are Outstanding, Above Expected Performance, Expected Performance, Below Expected Performance or Failure, and a written narrative is also included. The purpose of the narrative is to aid students in evaluating individual ability and performance; to aid the academic evaluation boards in making recommendations concerning the student's subsequent education, including graduate medical (residency) training; and to aid in preparation of the Medical Student Performance Evaluation (MSPE).

The faculty members of each course determine specific methods of evaluation, which may, for example, include examinations, case-based exercises and papers or observed structured clinical interactions. Examinations are conducted and graded consistent with the school's philosophy of emphasizing learning through self-motivation rather than through competition. Grades are determined on a "criterion-based" method and not on a grading curve.

The grade of Incomplete indicates that completion of examinations or other course requirements has been postponed because of student illness or other extenuating circumstances.

All records used by the faculty as a basis for recommendations for promotion, graduation or entry into graduate medical training of a student are available to that student upon request.

Students are required to take Step I, Step II Clinical Knowledge (CK) and Step II Clinical Skills (CS) examinations of the U.S. Medical Licensing Examination (USMLE) and to have their scores reported to UMMS. The Step I and Step II CK components of USMLE are computerized examinations that students schedule at a time convenient to them, usually following the second year (Step I) and sometime during the fourth year (Step II). The Step II CS is a performance-based examination scheduled by the student some time after completing required clinical clerkship experiences. For classes up to and including 2014, passing Step 1 and recording a score for Step II (CK and CS) is required for graduation. For classes of 2015 and after, passing Steps I and II (CK and CS) is a requirement for graduation. Passage of Step exams is not required for promotion.

Prior to graduation, students are required to become certified in Advanced Cardiac Life Support and to satisfactorily complete the Comprehensive Core Clinical assessment.

Monitoring Student Progress

The progress of FOM1 and FOM2 students is monitored by the Basic Science Academic Evaluation Board, while the progress of core clinical and advanced studies students is measured by the Clinical Science Academic Evaluation Board. These boards meet regularly throughout the academic year.

In the event of a less-than-satisfactory grade in any course, the appropriate evaluation board determines whether there is a remediation option which will not impact promotion. The Evaluation Boards do not make recommendations that will impact promotion or retention. In the case of a student's performance not meeting criteria for promotion or graduation, the case is referred to the School's Progress Board for review. The Associate Dean for Student Affairs notifies, in advance of each Progress Board meeting, any student when an action

that will impact promotion or graduation is likely to be considered, so that the student can provide additional information and appear at the Progress Board meeting in person if he or she chooses.

Promotion from FOM1 to FOM2 components of the curriculum, and from FOM2 to the Core Clinical Experiences curriculum, and progress during this period, is monitored by the Basic Science Academic Evaluation Board and by the Progress Board. Details and processes for evaluation by the Basic Science Academic Evaluation Board are updated annually in the School of Medicine student handbook.

The predominantly clinical curricula of the Core Clinical Experiences and Advanced Studies components are treated as a continuum by the Clinical Science Academic Evaluation Board and by the Progress Board. This board also assesses



Students receive MLK Semester of Service awards to support community projects

The annual tradition of engaging in service on Martin Luther King Jr. Day took on special significance for 13 UMass Medical School students as they received support to launch programs that will allow them to make semester-long community connections through service.

The 2013 MLK Semester of Service Student Award recipients will help refugee children heal from traumatic experiences through storytelling and performance; provide health education to residents of youth correctional facilities; provide complementary and integrative medicine services to women with gynecologic cancers; and improve the quality of free health care by formalizing Spanish-language interpreter services.

The MLK Semester of Service Student Award program is a community service initiative designed to support student-driven, community-responsive service and service-learning projects in the communities that surround the Worcester campus.

Each of the four project teams funded this year received \$500 to support implementation of their proposals, which require the students to partner with existing community organizations. The projects are designed to strengthen existing relationships with the community; address community needs and student learning objectives; and provide opportunities for members of the UMMS community to work together and engage with the larger community.





qualifications for graduation. Details and processes for evaluation by the Clinical Science Academic Evaluation Board are updated annually in the School of Medicine student handbook.

Withdrawals, Leaves of Absence and Readmission

Students may withdraw voluntarily from the School of Medicine at any time upon written request to the Associate Dean for Student Affairs. Readmission after voluntary withdrawal is not guaranteed. Reinstatement requires application in writing to the Committee on Admissions at least two months prior to the date of requested readmission. If the readmission is approved by the Committee on Admissions, the appropriate academic evaluation board will determine the level at which the student will be reinstated within the curriculum and the courses that will be required.

Students in good academic standing may request a leave of absence for one or more semester, not to exceed one year. In such cases, the appropriate academic evaluation board determines whether such a leave of absence is to be granted and sets any conditions for readmission. Readmission after an administrative leave of absence does not require action by the evaluation boards (unless specifically stated) or by the Committee on Admissions. Readmission after a leave of absence taken for medical reasons requires a letter from a physician or therapist acceptable to the appropriate evaluation board. Students returning from a leave of absence must do so at the start of a semester.

Students who fail to return from a leave of absence, in spite of notification by the Associate Dean for Student Affairs, will be considered to have withdrawn voluntarily from the School of Medicine and cannot be reinstated without positive action of the Committee on Admissions. Students are allowed a maximum of 6 years (12 semesters) of enrollment plus up to two years (4 semesters) of leave time.

Graduation

Regularly matriculated medical students who have fulfilled all requirements of the University, as certified by action of the Clinical Science Academic Evaluation Board, will be recommended by the Dean of the Medical School to the president and trustees of the University of Massachusetts for the degree of Doctor of Medicine. Requirements include satisfactory completion of four years of study as outlined by the curriculum and student handbook, satisfactory completion of an end of core clinical experiences assessment, successful completion of courses in Advanced Cardiac Life Support and transition to internship, and a passing score on Steps I, II CK and Step II CS of the U.S. Medical Licensing Examination (USMLE).

SOM 13-15

Admission, Tuition and Financial Aid



Schedule of Application Procedures

June 1: Submission of applications to AMCAS (American College Application Service) in Washington, D.C., begins.

August 1: Deadline for Early Decision applications to be received by AMCAS.

September 1: Deadline for Early Decision applications, including all supplemental materials, to be received by the School of Medicine Office of Admissions.

November 1: Deadline for applications to be received by AMCAS. An application received by AMCAS after this date will not be forwarded to the School of Medicine unless the applicant has been approved for an extension by the Office of Admissions.

December 15: Deadline for supplementary application materials to be received by the Office of Admissions.

May 15: Applicants will have been notified of acceptance, offered a position on the alternate list, or no offer of acceptance. Selection of the class may continue to the start of classes.

Admission

The School of Medicine's admission policy promotes the UMMS mission by offering a high-quality, accessible medical education to those qualified residents of the state who will best serve the commonwealth's health care needs through medical practice, public service, education and research.

A committee composed of representative faculty members and medical students determines selection for admission. A number of factors are carefully considered in the committee's review of each applicant's qualifications and in the selection of a matriculating class that will represent a broad and diverse spectrum of individuals, backgrounds and interests. These factors include, but are not restricted to, the following:

- prior academic performance;
- content and breadth of scholastic preparation;
- standardized test performance (MCAT);
- service activities which indicate an ability to work with people in a helping role;
- a baccalaureate degree;
- certified legal residency in the Commonwealth of Massachusetts (application to the MD/PhD Program is not restricted to residents of Massachusetts). For more information

- regarding the Determination of Massachusetts Residency Policy, please visit the Office of Admissions website: www.umassmed.edu/som/admissions/ residency.aspx.
- diversity in a variety of areas, including, but not limited to, socio-economic background, educational background, work experience, nationality, languages spoken, ethnicity, race, gender, genderidentity and sexual orientation. Also considered in diversity are students from disadvantaged backgrounds and "resiliency" in terms of positive capacity to cope with stress and adversity.
- extracurricular accomplishments;
- oral communication and interpersonal skills as documented in letters of support and in the interview;
- written communication skills as determined by academic performance, standardized testing and materials submitted in the application package;
- achievement in scientific research and/ or medically related service;
- evidence of motivation and preparedness for medicine; and
- attributes and values deemed necessary for physicians, including honesty, altruism, compassion, flexibility, maturity, intellectual curiosity, selfawareness, ability for self-directed learning and ability to work as a member of a team.

SOM 13-15

In consideration of the factors described above, the School of Medicine encourages students to pursue a pre-medical education of considerable breadth, including such coursework as English literature and composition, foreign languages, history, economics, ethics and the fine arts. In addition, all students must complete the coursework identified in Admission Requirements, demonstrating strong performance in the biological and physical sciences as a sound foundation for pursuing further study in the medical sciences.

No single program can be recommended as the "best" or "preferred" plan of study. Candidates are, therefore, encouraged to select educational programs that best reflect individual interests and aptitudes. Whenever possible, advanced study in a field of interest is encouraged, with particular emphasis on activities involving independent study.

Students who are granted advanced placement credits on their college transcripts for coursework taken in secondary school are advised to take additional college-level programs in these subject areas.

A Baccalaureate MD Pathway Program is now available for students enrolled in the undergraduate programs at the UMass Amherst, Boston, Dartmouth and Lowell campuses. For additional information about the program and its requirements, interested students should contact the Office of Admissions at the respective campuses and visit our website at www.umassmed.edu/som/admissions/index.aspx.

MA Residency Criteria

As the only public medical school in the Commonwealth of Massachusetts, it is the mission of this institution to serve the educational needs of Massachusetts residents. Applicants to the University of Massachusetts Medical School medical degree program MUST declare Massachusetts as their state of legal residence on their AMCAS applications. Only applications to the combined MD/PhD program are open to out-of-state residents.

- Applicants may not apply as a resident of more than one state. Applicants who do apply as a resident of Massachusetts will be required to complete the School of Medicine school specific Residency Validation form to complete their application.
- All applicants must be U.S. citizens or permanent residents.
- Massachusetts residency is routinely demonstrated by graduation from a Massachusetts high school.
 Applicants who have graduated from a Massachusetts high school are required to list the following on their AMCAS applications:
 - Massachusetts as their state of legal residence
 - Massachusetts as their permanent address (note: a post office box is not sufficient for consideration as a permanent address)

Applicants must also list the following on the school-specific Residency Validation secondary form:

 Massachusetts as their state of legal residence during high school (note: a post office box is not sufficient for consideration as a legal address.)

Those applicants who do not meet the specifics of the above criteria must "... show proof of continuous Massachusetts residency for a period of not less than five years immediately prior to enrollment."

The following documentation may be considered by the School of Medicine Admissions Committee in determining Massachusetts residency:

Foremost are five years of uninterrupted federal and state tax returns. Applicants must demonstrate they have listed Massachusetts as their legal residence on their federal and Massachusetts state tax returns. If the applicant's parents claim the applicant as a dependent on their taxes, the parent(s) must list Massachusetts as their legal residence on their federal and Massachusetts state tax returns. Partial year tax returns will be considered. In lieu of five years of uninterrupted federal and state tax

- returns, the following documents may be helpful in demonstrating Massachusetts residency:
- Residency of custodial parent(s) or legal guardian. A copy of a divorce decree may be required for documentation.
- Employment history in the state of Massachusetts (including W2 forms for as many years as possible).
- Military record listing Massachusetts as legal residence.
- · Massachusetts driver's license.
- Massachusetts voter registration.
- Marriage certificate listing
 Massachusetts as legal residence.
- Mortgage, rent, property tax or utility receipts in the applicant's name listing Massachusetts as legal residence.
- Government bills or invoices in the applicant's name listing Massachusetts as legal residence.

Producing only one or two sets of documents may not be sufficient in the absence of the tax returns. Please provide as many of the above listed documents as possible to assist the School of Medicine Admissions Committee in determining your Massachusetts residency. The committee reserves the right to consider each such case individually.

Additional Residency Requirements Information:

Attendance at a Massachusetts university or college does not, by itself, establish Massachusetts residency for the purposes of application to the School of Medicine. Applicants who are foreign nationals must possess a Resident Alien Registration Card ("Green Card") at the time of application to be considered for School of Medicine admission, in addition to satisfying the criteria established for Massachusetts residency.

Massachusetts residents currently attending a college, university or other school in another state or in the military service may still qualify for classification as a Massachusetts resident applicant if they meet other established criteria (graduated from a Massachusetts high school while a resident of Massachusetts for example).

Submission of documentation does not guarantee residency criteria will have been met by the applicant. Decisions are made on a case-by-case basis, depending on the information provided. Applicants will be notified of the Admissions Committee decision.

MD/PhD Applicants

Only applications to the combined MD/PhD program are open to out-of-state residents.

MD/PhD applicants who graduated from a Massachusetts high school and wish to be considered as a Massachusetts resident must list Massachusetts as their legal residence on their AMCAS applications. Applicants must complete the residency validation form required from all applicants declaring Massachusetts as their legal residence. MD/PhD applicants who did not graduate from a Massachusetts high school and do not meet the required continuous five years of residency prior to enrollment may be considered as an out-of-state resident.

Appeal Process

Should the Admissions Committee determine the applicant does not meet Massachusetts residency requirements, the applicant may appeal the committee's decision.

The applicant should contact the Office of Admissions via email [admissions@ umassmed.edu] expressing the intent to initiate the appeal process. Upon initiation of the appeals process, Admissions will notify the applicant of any additional information required (see Massachusetts Residency Criteria, above)

The Office of Admissions will respond in writing (email) acknowledging receipt of the appeal and with a list of requested information. The response will be sent to the candidate in writing (email) within 10 business days of receipt of the original appeal.

The applicant must submit to the Office of Admissions all requested documentation and any other information the applicant may view as applicable to the decision.

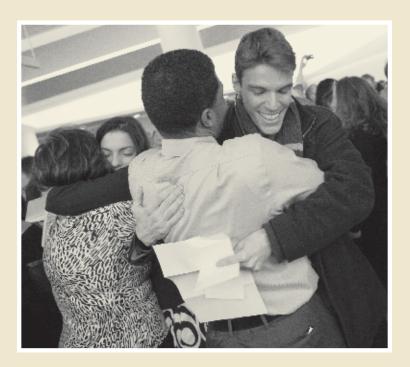
The appeal and requested documentation as well as the original submission materials related to Massachusetts residency will be reviewed by the UMMS School of Medicine Dean who will make the final decision regarding the applicant's residency status.

The candidate will be notified of the status of her/his appeal within 30 days of receipt of the candidate's submitted appeal documentation materials.

The applicant's full application fee will be refunded if the appeal is denied and he/she is not eligible for application to the School of Medicine.

Admission Requirements

Described below are the specific course requirements. Coursework in these areas must be completed within the last six years, and College Level Examination Program (CLEP) credit may not be used to satisfy these requirements. All required courses must be evaluated by traditional grading and not by a pass/fail system.



Joy and relief at Match Day 2013

Shouts of joy and relief filled the room as UMass Medical School's 123 graduating medical students learned where they would spend the next four to six years in residency training. Match Day, an annual rite of passage that happens all over the country on the same day at the same exact time, took on a new look in 2013 at UMMS, as students, family and friends gathered in the first-floor atrium of the Albert Sherman Center, the newly opened 512,000-square-foot education and research building that represents a new era of research, education and community life on campus.

Mai-Lan Rogoff, MD, who is retiring as associate dean for student affairs, distributed the envelopes for her 20th and final time, noting that once again, about half of students matched in primary care residencies. That number jumps to 70 percent when obstetrics & gynecology and emergency medicine residencies are included.

Half of graduating students will train in Massachusetts, with 22 staying at UMass Medical School to train with clinical partner UMass Memorial Health Care. Twenty-five students will go into internal medicine; 21 into pediatrics; 12 into family medicine; and six into medicine/pediatrics. An unusually large number of students matched into anesthesiology and dermatology—seven each.





Prerequisite courses must be taken at accredited colleges or universities in the United States or Canada. Applicants who have graduated from foreign colleges must have completed a minimum of one full year of study in an American or Canadian college/university, prior to submitting their application. The following courses are required:

- Biology: A one-year general biology or zoology course, with a laboratory component. Students wishing to pursue additional coursework in the biological sciences should consider genetics, embryology, cell biology or comparative anatomy.
- Chemistry: One year of inorganic and one year of organic chemistry, each with a lab.
- Physics: A one-year course in general physics, with a lab.
- English: At least one year of collegelevel English literature or composition.
 Applicants must demonstrate proficiency in the three domains of the English language, including reading, writing and oral communication.

The rapid expansion of the volume of medical literature and published research requires the ability to read rapidly with sound comprehension. Reading aptitude is essential, therefore, for learning as a student as well as for lifelong learning as a medical professional. Future physicians must also be able to write clearly, accurately and efficiently. In addition, the fundamental relationship between doctor and patient requires an ability to communicate verbally with empathy, clarity and respect. Finally, in professional relationships, the physician must communicate orally with other members of the health care team in a clear, concise, accurate and effective manner.

Additional Recommended Courses:

- Biochemistry: We are at an exciting time
 in medicine in which many diseases are
 becoming understood in terms of basic
 molecular processes. Biochemistry
 provides an important foundation
 for understanding how biological
 macromolecules perform the essential
 chemical processes required for life and
 health. A one- or two-semester course in
 biochemistry is recommended in order to
 provide the student with a solid basis for
 investigating how molecular malfunction
 can result in disease.
- Calculus: As the role of mathematics in the medical sciences continues to expand, a one-year introductory-level course in calculus is strongly advised.
- Sociology/Psychology: Applicants will find that the study of sociology and psychology provides important perspectives on human behavior, the interface between medicine and society, and an understanding of individuals as part of communities and populations. As our nation's population is becoming increasingly diverse, the cultural, demographic, linguistic, socioeconomic and ethnic backgrounds of patients are also changing. Courses that develop social awareness and an ability to constructively address societal variables will promote the attitudes and skills required to deliver culturally sensitive care to a diverse patient community.
- Statistics: There has been a rapid growth
 in clinical and epidemiological research
 fueled by the need to identify and
 promote cost-effective, evidenced-based
 medical care. Students will find that an
 understanding of statistical methods
 and terminology is essential to critically
 analyzing these studies and constructively
 applying the findings to the study and
 practice of medicine.
- Computer Literacy: As electronic technology expands, medical information will be universally transmitted and managed through computerized systems. In order to learn and use the technological advances in medical documentation and information systems, applicants must have a working

knowledge of desktop systems, common software packages (word processing, spreadsheets and databases) and educational informatics.

Prospective applicants are advised to consult the Association of American Medical Colleges (AAMC) Medical School Admission Requirements that can be purchased through the AAMC. This publication provides general recommendations concerning preparation for the study of medicine as well as specific information about the University of Massachusetts Medical School and other accredited American and Canadian medical schools.

Application Process

Applications for admission to School of Medicine must be made through the AMCAS. Applications are accepted between June 15 and November 1 of the year prior to admission. The deadline for completion of the application is December 15.

All applicants are required to take the Medical College Admissions Test (MCAT). Arrangements for taking the MCAT, requesting test reports, and questions concerning administration, scoring and processing of the test should be directed to the MCAT office.

Applicants are also required to complete a UMass School of Medicine supplementary application as well as a certification form documenting residency status in Massachusetts.

Admission Policy and Acceptance Procedure

The Committee on Admissions will review an application only when complete, with all supporting documents, as described below:

- The completed AMCAS application
- Supplemental application forms
- Technical Standards acknowledgement
- Off Campus Interview Option
- Transcripts of courses taken after completion of AMCAS application. Once the verified application has been processed by AMCAS and received by the Office of Admissions, any additional transcripts for subsequent coursework should be forwarded directly to the School of Medicine Office of Admissions for as long as the application remains active.

· Letters of Recommendation. Applicants should send all letters of recommendation directly to AMCAS who will forward the letters to the Office of Admissions electronically. AMCAS will accept letters from users of VirtualEvals, Interfolio, and via the U.S. Postal Service. If letters are being transmitted to the Admissions Committee by your undergraduate advising office, it is possible that office is using VirtualEvals. Once your letters are posted to VirtualEvals, they will be downloaded by AMCAS and made available to the Office of Admissions. If an applicant has a question about whether or not his or her advising office uses VirtualEvals, please contact the undergraduate advising office. The address to which letters should be mailed will appear on the AMCAS Letter Request Form. For more information on this process, please visit AMCAS Letters FAQ: https://www.aamc.org/students/applying/ amcas/faqs/63226/faq_amcasletters. html

If available to the applicant, an official recommendation from his/her school's pre-medical advisory committee is required. In the event that such documentation is not provided by the applicant's school, two letters of reference must be provided from instructors in the prerequisite science courses. Letters of recommendation from commercial advisors are discouraged and are not substitutes for this requirement.

- MCAT. Applicants must have taken the MCAT within the three years prior to application.
- Non-refundable application fee.

Receipt of the AMCAS application will be acknowledged promptly by the School of Medicine Office of Admissions. It is the applicant's responsibility to ensure that all required documents are received. It is recommended that application materials be submitted as early as possible.

Once complete, each application is reviewed by the Committee on Admissions and a decision is made regarding the offer of an interview. An interview is required for acceptance, and interviews are conducted in Worcester at the invitation of the committee.

Important Contact Information

University of Massachusetts Medical School

55 Lake Avenue North
Worcester, MA 01655-1111
Office of Admissions:
508-856-2323
email: admissions@umassmed.edu
Website: http://www.umassmed.edu/

som/admissions

Office of Student Affairs

508-856-2286

Association of American Medical Colleges

2450 N Street NW Washington, DC 20037-1126 (202) 828-0400 Fax: (202) 828-1125

Website: https://www.aamc.org/

American Medical College Application Service (AMCAS)

Association of American

Medical Colleges
Section for Student Services
2501 M Street, NW, Lobby 26
Washington, DC 20037-1300
(202) 828-0600
Fax: (202) 828-1120
email: amcas@aamc.org
Website: https://www.aamc.org/
students/applying/amcas/

Medical College Admission Test (MCAT)

MCAT Program Office
P.O. Box 4056
Iowa City, IA 52243-4056
(319) 337-1357
Website: https://www.aamc.org/students/applying/mcat/

National Board of Medical Examiners

3750 Market Street Philadelphia, PA 19104-3190 (215) 590-9500 Fax: (215) 590-9555

Website: http://www.nbme.org/

United States Medical Licensing Examination

Office of the Secretariat 3750 Market Street Philadelphia, PA 19104-3190 (215) 590-9600 Fax: (215) 590-9470 Website: http://www.usmle.org/

Educational Commission for Foreign Medical Graduates

3624 Market Street, 4th Floor Philadelphia, PA 19104-2685 (215) 386-5900 Fax: (215) 387-9963 Website: http://www.ecfmg.org/

Applicants who have graduated from an undergraduate program are advised to contact their pre-medical college advisor for assistance with their application. This service is available no matter the length of time since graduation. The National Association of Advisors for Health Professionals,

National Association of Advisors for Health Professionals, Inc.

Inc. has information on its website for

those who, for whatever reason, do not

have access to a pre-medical advisor.

P.O. Box 1518 Champaign, IL 61824-1518 (217) 355-0063 Fax: (217) 355-1287

With the exception of the Early Decision Plan (see page 36), acceptances will be offered beginning in October and thereafter until the class is filled. Applicants selected for admission will be notified by email and a follow-up letter from the Committee on Admissions. Accepted applicants will be expected to either accept or reject this offer within two weeks. In exceptional circumstances, applicants may be granted an additional two weeks to respond to the committee's offer of acceptance. Applicants are offered a provisional acceptance and are subject to a criminal background check (CBC). If the CBC reveals some prior contact with the criminal justice system, the applicant will be offered a full opportunity to respond. Provisional acceptances may (or may not) be withdrawn pending the school's review of that history and the applicant's response. The School of Medicine's process for CBC review includes the option of an appeal, in the event that a conditional offer of acceptance is withdrawn.

Once the class has been filled, the remaining applicants will be notified. Thereafter, a list of alternates will be prepared.

In the event that an enrolled student withdraws prior to matriculation, a replacement will be selected from the list of alternates. Applicants who are offered a position on the alternate list must communicate to the Office of Admissions their desire to be included on the list.

UMMS requires completion of the Student Health Clearance form prior to matriculation. It is imperative that the form be finalized prior to the start of classes since clinical work begins early in the first term. Without completion of the forms documenting immunity to contagious diseases, students may be restricted from clinical experiences.

Accepted students are provided with the Blood-Borne Pathogen Summary and Statement of Acknowledgement. Students must read and understand the School of Medicine policy regarding students with a blood-borne pathogen infection and return the signed Statement of Acknowledgement. Students who may transmit bloodborne pathogens may be restricted from situations that place others at risk.

An applicant who initially accepts an offer of admission to the School of Medicine and later decides to withdraw will be expected to inform the Office of Admissions promptly in writing so that another candidate may be offered a position.

Early Decision Plan

A strong applicant who is interested in applying only to UMMS may wish to submit an Early Decision application. An applicant who does not receive an offer of acceptance under the Early Decision Plan will automatically be considered for possible acceptance at a later date with the general pool of candidates.

Early Decision applications must be received by AMCAS by August 1 of the year prior to matriculation. Applications, including supplementary materials and fees, must be complete in the Office of Admissions by September 1. Final decisions regarding acceptance for Early Decision will be made by October 1.

Evaluation of Applicants

The Committee on Admissions is composed of faculty members representing various disciplines from the basic and clinical sciences and two medical students.

Committee members carefully review each application and all enclosed information provided by or on behalf of the applicant.

The University adheres strictly to all applicable state and federal regulations relating to non-discrimination and equal opportunity. The decision to grant an interview is determined by committee members and is guided by the qualification standards previously described as well as by the merits of the applicant in comparison to the rest of the candidate pool.

Due to the large number of applications submitted each year, it is not possible to interview all applicants. The Admissions Office will notify those applicants who are selected for an interview. The interview provides an opportunity for direct exchange of information between the applicant and the School of Medicine faculty and Committee on Admissions. It also offers the applicant an introductory exposure to the learning environment and educational philosophy of UMMS as well as direct contact with students who actively participate in the interview day program.

Deferral Policy

UMMS discourages granting of deferrals. However, requests for deferrals may be submitted directly to the Associate Dean for Admissions and will be considered on an individual basis.



Transfers and Advanced Standing

Only transfer students with advanced standing at an Liaison Committee on Medical Education (LCME) accredited medical school are accepted to fill the few vacancies resulting from the withdrawal of previously enrolled students. Students interested in the possibility of transferring to the School of Medicine should direct inquiries to the Office of Admissions. Information regarding current policy on transfers and, when appropriate, application forms and instructions for applying will be sent to all potential applicants. It should be noted that the same residency requirements must be met as for those students entering the first year.

Given the integrated model for our courses and curricular framework, requests for advanced standing will be considered on a case-by-case basis. Under the oversight of the Associate Dean for Undergraduate Medical Education, requests for advanced standing in a given course will be reviewed by the respective curriculum committee and subject to approval by the designated course co-leaders. Requests for advanced standing should be directed to the Associate Dean for Undergraduate Medical Education.

Technical Standards for Admission, Continuation and Graduation

Revised: July 9, 2009

Introduction

The mission of the University of Massachusetts School of Medicine is to graduate skilled and effective physicians. It is the responsibility of the faculty to select applicants from among residents of the commonwealth who are best qualified to complete the required training and most likely to become the best possible physicians. Applicants are selected for admission to the school based not only on their scholastic achievement and ability, but also on their intellectual, physical and emotional capacities to meet the requirements of the school's curriculum and of a successful career in medicine. The faculty of the University of Massachusetts School of Medicine recognizes that academic competency is essential for success in medical school. Such things as intellectual curiosity, undergraduate grades and the MCAT examination help to demonstrate academic competency. The Admissions Committee is instructed to exercise its judgment on behalf of the faculty in selecting the entering class. The committee is asked to consider not only academic ability, but also character, integrity, extracurricular achievement, commitment to service, ability to contribute to the advancement of medical knowledge and biomedical research, the likelihood of providing primary care in the commonwealth, serving the health care needs of our underserved communities, and overall suitability for the medical profession based upon information in the application, letters of recommendation and personal interviews.

The Liaison Committee on Medical Education, which accredits the Medical School, requires that the curriculum provide a general professional education, enabling each student to pursue graduate training in a variety of disciplines. Also, one of the missions of University of Massachusetts School of Medicine is to graduate a significant number of generalist physicians. This requires the development of broad knowledge, skills and behaviors, enabling ongoing self-directed learning, further training and delivery of competent medical care. The faculty of the University of Massachusetts School of Medicine believes that such a broad based and patient oriented curriculum is best suited for future generalists, specialists and physician investigators. The basic sciences curriculum includes anatomy, biochemistry, histology, pathology, pharmacology and physiology and is designed to establish a core of knowledge necessary for clinical training. The clinical curriculum begins early in the first year and includes diverse experiences in primary care, family medicine and ambulatory patient care. The third and fourth year include in-depth experiences in primary care, family medicine, internal medicine, obstetrics and gynecology, pediatrics, psychiatry, surgery, diagnostic imaging, pathology, emergency medicine, geriatrics and rehabilitation medicine in ambulatory and inpatient settings. These experiences provide a broad basis for the practice of medicine, regardless of the future choice of specialty. Each student is required by the faculty to successfully complete each required course and clinical rotation to graduate.

The following technical standards specify those attributes the faculty considers necessary for completing medical school training, enabling each graduate to subsequently enter residency and clinical practice. These standards describe the essential functions students must demonstrate in order to fulfill the requirements of a general medical education and, thus, are prerequisites for entrance, continuation, promotion, retention and graduation from medical school.

The University of Massachusetts School of Medicine will consider for admission any applicant who meets its residency requirement, academic criteria, and demonstrates the ability to perform or to learn to perform the skills listed in this document, with or without reasonable accommodations consistent with the Americans with Disabilities Act (ADA). Any applicant with questions about these technical requirements is advised to discuss the issue with the ADA Student Coordinator prior to the interview process.

Certain chronic or recurrent illnesses that interfere with patient care or safety are not compatible with medical practice or training. Any student who is a carrier of a blood-borne pathogen [including, but not limited to, hepatitis B virus, hepatitis C virus and human immunodeficiency virus (HIV)] will not be permitted to perform some invasive procedures. This will restrict the student's ability to perform fully in some clinical clerkships and to meet the requirements of some specialties; therefore, the student will possibly be prohibited from future training and practicing in those fields. Other conditions that may lead to a high likelihood of debilitating student illness should also be carefully considered before committing to a clinical career. Deficiencies in knowledge base, judgment, integrity, character, or professional attitude or demeanor, which may jeopardize patient care, may be grounds for immediate removal from the clinical situation, course/rotation failure and possible dismissal.



A student must possess aptitude, abilities and skills in five areas:

- observation
- communication
- sensory and motor coordination and function
- conceptualization, integration and quantitation
- behavioral and social skills, abilities and aptitude

These are described in detail below. Students must be able to independently perform the described functions.

1. Observation

Students must be able to observe demonstrations and conduct experiments in the basic sciences, including, but not limited to: anatomic dissection of preserved tissues and cadavers, physiologic and pharmacologic demonstrations in animals, microbiologic cultures, microscopic studies of microorganisms and animal and human tissues in normal and pathologic states. A student must be able to observe patients accurately at a reasonable distance and close at hand, noting nonverbal as well as verbal signals. Specific observational requirements include, but are not limited to, the following abilities: detecting and identifying significant changes in colors of fluids, skin, culture media and dipstick tests; perceiving with acuity and accurately discriminating findings on X-rays and other imaging tests; efficiently reading written and illustrated material; observing intracellular details through a microscope; observing demonstrations in the classroom, including projected slides, films, videos and overheads; observing and differentiating changes in body movement; observing anatomic structures; discriminating numbers and patterns associated with diagnostic instruments and tests, such as sphygmomanometers and electrocardiograms, and using instruments competently, such as the otoscope, ophthalmoscope, microscope and stethoscope.

2. Communication

Students must be able to relate effectively and sensitively with patients of all genders as well as all ages, races, life-styles, sexual orientations and cultural backgrounds, and be able to convey a sense of compassion and empathy. A student must be able to communicate clearly with and observe patients in order to elicit information; accurately describe changes in mood, activity and posture; and be able to perceive verbal as well as nonverbal communications. Communication includes not only speech but also reading and writing. Medical education presents exceptional challenges in the volume and breadth of required reading and the necessity to impart information to others. Students must be able to communicate quickly, effectively and efficiently in oral and written English with all members of the health care team. Specific requirements include, but are not limited to, the following abilities: communicating rapidly and clearly with the medical team on rounds; eliciting a thorough history from patients; and communicating complex findings in appropriate terms to patients and to various members of the health care team (fellow students, physicians, nurses, nurses' aides, therapists, social workers and others). Students must learn to recognize and promptly respond to emotional communications, such as sadness, worry, agitation and lack of comprehension of physician communication. Each student must be able to read and to record observations and plans legibly, efficiently and accurately in documents, such as the patient record and the electronic record. Students must be able to prepare and communicate concise but complete summaries of individual encounters, including hospitalizations. Students must be able to complete forms according to directions in a complete and timely fashion. Students must be computer literate and able to access patient records and medical information with facility.

3. Sensory and motor coordination or function

Students must be able and willing to perform with acuity, accuracy and facility a complete physical examination on any patient of all genders, utilizing palpation, auscultation, percussion and other diagnostic maneuvers. In general, this requires sufficient ability to observe with acuity and to process accurately visual, auditory, exteroceptive (smell, touch, pain and temperature) and proprioceptive (position, pressure, movement, stereognosis and vibratory) phenomena as well as the ability to manipulate with precision, at a fine level of movement, patients and medical instruments and equipment. Methods of surgical instruction include practice on living or preserved animal tissues. A student must be able and willing to provide general care and emergency treatment to any patient of all genders in a timely manner. Furthermore, a student must be able to respond promptly to medical emergencies within the hospital and must not hinder the ability of co-workers to provide prompt care. Examples of such emergency treatment reasonably required of physicians include arriving quickly when called and initiating cardiopulmonary resuscitation, administering intravenous medication, applying pressure to stop bleeding, opening obstructed airways, suturing wounds and performing basic obstetrical maneuvers. Cardiopulmonary resuscitation may require moving an adult patient, repeatedly and rapidly applying considerable chest pressure, delivering an adequate volume of artificial respiration and calling for help. A student must be able to learn to perform basic laboratory tests, e.g., urinalysis, completed blood count, and diagnostic and therapeutic procedures, e.g., phlebotomy, arterial blood gas drawings, lumbar puncture and arthrocentesis. Students must be able to measure angles and diameters of various body structures using tape measure and goniometer, measure blood pressure and pulse and interpret graphs describing biologic relationships. Clinical rotations in ambulatory care settings require the ability to transport oneself to a variety of ambulatory settings in a timely manner, and inpatient rounds require prolonged and rapid movement.

4. Intellectual-conceptual, integrative and quantitative abilities

These abilities include measurement, calculation, reasoning, analysis, judgment and synthesis. The student must also be able to recognize letters and numbers quickly and accurately. Clinical reasoning and problem solving are critical skills demanded of physicians requiring all of these intellectual abilities, and they must be performed quickly, especially in emergency situations. Moreover, the effective physician often must deal with several tasks or problems simultaneously ("multi-tasking"). Students must be able to identify significant findings from history, physical examination, and laboratory data, provide a reasoned explanation for likely diagnoses, construct a reasoned and costeffective diagnostic plan, and prescribe medications and therapy, recalling and retaining information in an efficient and timely manner. Students must be able to identify and communicate the limits of their knowledge to others when appropriate. The ability to incorporate new information from peers, teachers and the medical literature in formulating diagnoses and plans is essential. Good judgment in patient assessment, diagnostic and therapeutic planning is essential.

5. Behavioral and social attributes

Empathy, integrity, honesty, concern for others, good interpersonal skills, interest and motivation are all personal qualities that are necessary for any physician. Students must be able, in all clinical and academic settings, to fully utilize their intellectual abilities, to exercise good judgment and to promptly complete all responsibilities attendant to the diagnosis and care of patients. They must be able and willing to develop mature, sensitive, professional and effective relationships with patients of all genders, ages, races, lifestyles, sexual orientations and cultural background, as well as with patients' families, with other health care providers and with all members of the learning and working community. At times this requires the ability to be aware of and appropriately react to one's own immediate emotional responses, e.g., students must maintain a professional demeanor and be able to function at a high level in the face of



personal fatigue, dissatisfied patients and their families and tired colleagues. Students must be able to develop professional relationships with patients and their families, providing comfort and reassurance when appropriate while protecting patient confidentiality. Students must be able to maintain professional conduct when interacting with patients and the families of patients suffering from catastrophic illness, trauma and death. Students must possess adequate endurance to tolerate physically taxing workloads and to function effectively under stress. All students must be able and willing to work on any day of the week and on any day of the year when called upon to serve in scheduled clinical activities or learning opportunities. All students are at times required to work for extended periods, occasionally with rotating and overnight shifts. Students must be able to adapt to changing environments, to display flexibility and to learn to function in the face of uncertainties inherent in the clinical problems of many patients. Students are expected to accept appropriate suggestions and criticism and, when necessary, to respond by modifying their behavior.

Tuition and Fees

Full tuition for the 2012-13 academic year is \$8,352. Two-thirds tuition subject to the Learning Contract is \$5,568. Students enrolled for school courses for credit are assessed the full tuition for each semester of enrollment. The first semester after a student has completed eight full semesters of Medical School tuition payments, excluding prior semesters of compensation-based tuition waiver was received, the student's status will change to extended student program fee status. The student is not assessed tuition, but is assessed the extended student program fee on a per semester basis, plus all other student fees.

Students who register late and/or who are delinquent in the valid repayment of bills will be assessed a late registration fee and/or a late payment fee. Tuition and fees may be changed at any time without prior notice. For updated information about tuition, fees and related policies, please visit www.umassmed.edu/som/tuition

Learning Contract

The School of Medicine offers matriculated students, whether or not they apply for other types of financial aid, a Learning Contract. The Learning Contract is a financial instrument that defers two-thirds of tuition and functions in the manner of an 8 percent loan that can be repaid with either money

or certain legislated service. Interest will accrue at the rate of 8 percent beginning the latter of six months after ceasing enrollment at UMMS or the end of the first year of residency. There is a six-month grace period after completion of medical residency or fellowship or six months after graduating from the School of Medicine if one does not enter a residency. To pay with service, a graduate needs to work the equivalent of full time for 48 consecutive months in Massachusetts. The service payback must meet one of three criteria: a primary care practice anywhere in the commonwealth; any other practice in an underserved area, if one exists; or in community or public service of particular benefit to the commonwealth. Those seeking to pay with service must gain prior approval from the Learning Contract Advisory Group. Additional information about the Learning Contract can be found at http://www. umassmed.edu/financialaid

Refund Policy

Refunds are calculated when students do not register for the academic term for which they are charged, take an approved leave of absence or otherwise fail to complete the program on or after the first day of class of the period of enrollment for which charges are assessed.

Students who cease enrollment after 60 percent of the term has elapsed receive no refund and are not required to refund any federal aid received for the term. Students who cease enrollment before 60 percent of the term has elapsed receive a refund for the percentage of the term remaining after the last date of attendance. The percentage is calculated by dividing the number of calendar days elapsed between the beginning of the term and the date the individual ceases enrollment by the number of calendar days in the term. For example, a student who withdraws 57 percent of the way through the first term of enrollment receives a refund of 43 percent of tuition and fees (100 percent minus 57 percent). If a student received Title IV funds, this refund must be returned to the Title IV program. Additionally, according to federal rules, the student is also required to refund 43 percent of aid received as cash or from a credit balance. Failure to return unearned

Title IV aid may result in ineligibility for future federal aid.

Allocation of Refunds

A share of the refund will be returned to the financial aid programs that funded students. Refunds and recovered overpayments are allocated to the programs from which an individual received aid in the following order:

- · Federal Unsubsidized Stafford Loan
- · Federal Stafford Loan
- · Federal Perkins Loan
- · Other Federal Student Aid Programs
- Institutional Student Aid Programs
- · State Student Aid Programs
- Private Student Aid Programs Student

Students must notify the Dean of the respective graduate school and the Registrar in writing of their intent to withdraw. Students who withdraw without notifying the Dean and Registrar of their status will be considered withdrawn as of the last recorded date of class attendance as documented by the University.

Upon request, the School Bursar will provide examples of the application of these policies. Any withdrawn student who believes that individual circumstances warrant exceptions from published policy may make a written appeal to:

Nancy E. Vasil Director of Financial Services University of Massachusetts Medical School 55 Lake Avenue North Worcester, MA 01655

Note: This policy is subject to change at any time without prior notice if necessary to comply with federal law.

Financial Aid

Students and their families, i.e., parents, stepparents and spouses, share the major responsibility of financing undergraduate medical education. Because the majority of financial assistance available to medical students is loan aid, UMMS encourages only those students who are unable to fund their own education to apply for financial aid. Furthermore, UMMS encourages loan recipients to plan for repayment of their student loans before borrowing their first loan. Descriptions of all federal student financial aid programs are subject to legislative and regulatory changes without prior notice.

To be eligible for financial assistance, students must be accepted for admission or enrolled in good standing and making satisfactory academic progress. In addition, they must neither owe a repayment on a Federal Pell Grant, Federal Supplemental **Educational Grant or State Student Incentive** Grant, nor be in default on a Federal Perkins Loan (formerly National Direct Student Loan), Federal Stafford Loan Federally Insured Student Loan, Federal Supplemental Loan for Students, Federal PLUS or Federal ALAS loan received for study at any postsecondary institution. Furthermore, students must demonstrate either federal eligibility or financial need to be eligible for most, although not all, financial aid programs. Because financial aid is awarded annually, all financial aid recipients need to reapply each year.

The Financial Aid Office will process applications for students who apply for only Federal Unsubsidized Federal Stafford Loans as soon as they are complete. The Financial Aid Office can award its limited institutionally based funds only after the majority of applicants for institutional aid complete their applications. Each year an individual student's financial aid package is a mathematical function of the total institutionally based gift aid available and the need—after subtracting the calculated parental contribution, whether or not it is actually provided—of all students applying for institutionally based funds. Awards may vary by students' length of enrollment and vary annually depending on available funds.

It is the responsibility of students to read all directions and make certain that all required forms are received by the Financial Aid Office by published deadlines. Students who submit application materials after deadlines have passed may be ineligible for institutionally controlled funds. Information and application materials can be found at the Financial Aid Office's website at www. umassmed.edu/financialaid/.

Gift Aid

Students applying for institutional aid must complete the entire financial aid application, including questions about parental income and assets. Forms of gift aid include but are not limited to:

Alumni Association Scholarship

Each year, the UMMS Alumni Association grants several scholarships of either \$1,500 or \$2,500 to students with financial need.

Anonymous Scholarship Fund

In July 1971, an anonymous donor created an endowment fund at UMMS. When income from this endowment fund is sufficient, scholarships are granted to medical students with financial need.

Parking Violation Scholarship

The Parking Violation Scholarship Fund receives revenue from parking fines attributable to violations on the University campus. Gift aid from this fund is awarded to students with financial need at UMMS.

Alfred M. Rothschild Scholarship Fund

The family of Alfred M. Rothschild, MD, established an endowment fund in August 1984 for the purpose of student support. When sufficient income from the fund is available, gift aid is awarded to medical students with financial need.

Scholarships for Disadvantaged Health Professions Students (SDS)

SDS funds, which were first authorized in 1991-92, are allocated to the University from the federal Department of Health and Human Services. Scholarship recipients must be both disadvantaged and demonstrate financial need.

Walter N. Secord Endowment Fund

The Secord Endowment Fund was established in 1980 in memory of Walter N. Secord, MD. When sufficient income from the fund is available, gift aid is awarded to medical students in financial need.

Student Support Fee Scholarship

Each year a portion of the student support fee paid by students is made available for scholarships for students with documented need for institutional aid.

Tuition Waiver (Need-Based)

The Board of Trustees of the University of Massachusetts approves an annual dollar amount of need-based tuition waivers for medical students. Eligibility for tuition waivers is limited to students who complete institutional financial aid applications and who have documented need. Need-based tuition waivers do not reduce tuition deferred by the Learning Contract.

UMass Memorial Physicians Group Scholarship

Established in 1988 by the UMass Memorial Physicians Group, these scholarships are awarded annually to students with financial need based on the income available from the endowment.

Worcester District Medical Society Scholarships

UMMS does not administer this fund. These scholarships are awarded to medical students with financial need who are residents of Central Massachusetts. Other District Medical Societies across the commonwealth offer similar programs to students that are residents of towns within their district. Students are encouraged to contact these Societies directly for further information.

Loan Programs

Federal Perkins Loan (formerly National Direct Student Loan)

Federal Perkins Loan funds are allocated to the University from the federal government. The annual federal allocation is supplemented with institutional matching funds and collections from previous borrowers. Students who provide parental information on the FAFSA and CSS Profile, as well as parental tax returns, are considered for Federal Perkins Loans. Eligible students must demonstrate federal eligibility and satisfactory academic progress. Depending on the availability of funds, professional students may borrow an annual maximum of \$6,000. The total outstanding balance on all undergraduate and graduate Federal Perkins Loans may not exceed \$40,000. Federal Perkins Loans carry 5 percent interest. Loans for borrowers with outstanding balances disbursed before July 1, 1987, have a six-month grace period; loans for first-time borrowers as of July 1, 1987, have a nine-month grace period.

Borrowers may receive deferments during periods of at least half-time student status, graduate fellowship, or rehabilitative study for the disabled, excluding a medical internship or residency program; for a maximum of three years during which the borrower seeks, but is unable to find, full-time employment; for a maximum of three years during which, according to federal regulations, repayment would present a financial hardship; or if the borrower is engaged in service eligible for partial cancellation of the loan.

Federal Direct Unsubsidized Stafford Loan

Federal Direct Unsubsidized Stafford Loans (formerly Guaranteed Student Loans or GSL) are federally insured educational loans made to students by the federal government. Eligible applicants must maintain satisfactory academic progress in a program of study leading to a degree, demonstrate eligibility as defined by federal regulations and file appropriate financial aid applications In an academic year, an eligible student may borrow a maximum that is the least of \$47,167, the cost of education minus other financial aid. Stafford Loans, including both subsidized and unsubsidized, may not exceed \$224,000.

The interest rate as of July 1, 2006, is fixed at 6.8 percent per year. All loans are disbursed twice during the loan period, one-half at the beginning and one-half midway through the loan period. Interest accrues on the loan during periods of enrollment.

Two fees, a 3 percent origination fee and a 1 percent guarantee fee, are deducted from loan proceeds.



First-time borrowers after June 30, 1993, may receive deferments during periods of at least half-time student status, graduate fellowship or rehabilitative study for the disabled; for a maximum of three years during which the borrower seeks, but is unable to find, full-time employment; and for a maximum of three years during which, according to federal regulations, repayment would present a financial hardship. Borrowers with outstanding balances on Stafford Loans made before July 1, 1993, should check their promissory notes to see the additional deferments to which they are entitled.

Lenders must grant forbearance to any medical intern or resident who requests it. Forbearance is defined as the cessation of scheduled payments for a proscribed period of time. Interest continues to accrue, and may be capitalized, during periods of forbearance. The lender will require documentation of internship or residency.

Federal Graduate PLUS Loan

Graduate students may borrow up to the cost of attendance minus any other aid. The interest rate is fixed at 8.5 percent and interest accrues during periods of enrollment. Borrowers must pass a credit check to be eligible for these loans. There is no cumulative principal balance maximum on these loans. Two fees, a 3 percent origination fee and a 1 percent guarantee fee, may be deducted from loan proceeds. Some guarantee agencies or lenders may pay some or all of the fees for borrowers.

Loans for Disadvantaged Health Professions Students (LDS)

First authorized in 1991-92, LDS funds are allocated to the University from the federal government. The annual federal allocation is supplemented with institutional matching funds and collections from previous borrowers. Only medical students with financial need who complete the entire financial aid application and submit parental income tax returns and parental information on the FAFSA and CSS Profile may be considered for this program. LDS loans have a five percent simple interest rate and a

one-year grace period. No interest accrues on loans during in-school periods, grace periods and authorized periods of deferment. Deferments are granted for residency training and for service in the National Health Service Corps, military or Peace Corps.

Massachusetts Medical Society Loan

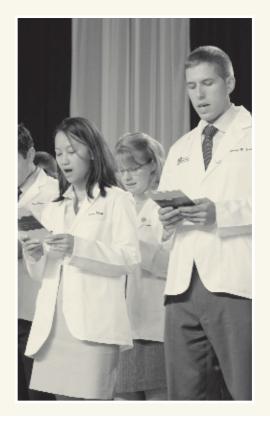
Every year the Massachusetts Medical Society makes loans that have interest rates that vary from 1 percent to 6 percent during the life of the loans available to third- and fourth-year students with financial need at UMMS. Although UMMS does not administer this loan fund, the Financial Aid Office awards MMS loans as if they were institutionally controlled funds. During academic year 2012-13, UMMS was authorized to make 60 loans at \$5,000 each.

Alternative Education Loan Programs

In addition to the major federal and institutional loan programs, several privately sponsored alternative loan programs may be used to meet need and/or replace calculated family contributions. Examples of these programs include the Sallie Mae Smart Loan, MEFA Alternative Loan and MEDCAP Alternative Loan. Common elements shared by these loan programs include variable interest rates that accrue from the date the loan is disbursed, insurance fees that are deducted from loan proceeds and the requirement that borrowers be creditworthy. The maximum annual and cumulative loan, specific interest rate, provisions for deferment and frequency and compounding of accrued interest and other fees vary by program and may vary from year to year. Only participating lenders provide these loans; the lender and guarantor may change during the course of a borrower's enrollment in medical school.

Emergency Loan

Interest-free, short-term emergency loans are available to students who have unanticipated, bona fide financial emergencies; have not been delinquent on a previous emergency loan; and do not owe past-due tuition, fees or other charges to the school. Loans less than \$101 are due in 30 days; loans between \$101 and \$300 are due in 60 days; and loans between \$301 and \$500 are due in 90 days. The maximum loan is \$500. Applications are available in the Financial Aid Office. Failure to repay emergency loans on time leads to suspension of eligibility for future emergency loans and possible administrative withdrawal.



SOM 13-15

Residency and Fellowship Programs at UMass Medical School

Graduate Medical Education (GME) at the University of Massachusetts Medical School consists of 52 accredited programs, from anesthesiology to vascular surgery, 538 residents and fellows, more than 2,500 full-time and community-based faculty, an academic medical center, affiliated teaching hospitals and community health centers, and a growing number of private office and group practices. As a teaching institution, UMMS has received the highest approval rating from the Accreditation Council on Graduate Medical Education (ACGME).

UMMS is committed to ensuring that all GME trainees receive the highest quality clinical education and obtain desired academic or practice positions upon graduation. Most recent graduates said that they would highly recommend their program to medical school seniors, and further stated that their program provided them with clinical and problem-solving skills necessary for independent practice. More than half of recent GME program graduates entered practice immediately following their residencies, mostly in Massachusetts and bordering states, while others entered competitive advanced training programs nationwide.

ACGME Accredited Residency Programs

Anesthesiology

Child Psychiatry

Dermatology

Emergency Medicine

Family Medicine, Worcester

Family Medicine, Fitchburg

Internal Medicine

Medicine/Pediatrics

Neurology

Obstetrics and Gynecology

Orthopedic Surgery

Pathology/Clinical and Anatomical

Pediatrics

Plastic Surgery

Preventive Medicine

Psychiatry

Psychiatry/Neurology

Radiology/Diagnostic

Surgery/General

Vascular Surgery

ACGME Accredited Fellowship Programs

Abdominal Imaging/Radiology Addiction Psychiatry Anesthesiology-Critical Care

Cardiovascular Medicine

Clinical Cardiovascular EPS

Colorectal Surgery

Cytopathology

Dermatopathology

Emergency Medicine/Toxicology

Emergency Medicine/EMS

Endocrinology and Diabetes

Family Sports Medicine

Female Pelvic Medicine and

Reconstructive Surgery

Forensic Psychiatry

Gastroenterology

Geriatric Medicine

Hematology/Oncology

Hematopathology

Infectious Disease

Interventional Cardiology

Neonatal-Perinatal Medicine

Nephrology/Renal

Neurology/Clinical Neurophysiology

Neuropsychiatry

Neuroradiology

Orthopedics/Hand Surgery

Orthopedics Sports Medicine

Pulmonary Medicine/Critical Care

Procedural Dermatology

Rheumatology

Surgical Pathology

Vascular Interventional Radiology

Vascular Neurology

NON-ACGME Accredited Fellowship Programs

Breast Imaging/Radiology

Breast Surgery

Emergency Medicine Disaster

International Emergency Medicine

Fellowship

Emergency Medicine Ultrasound

Interventional Neuroradiology

MRI Radiology Advanced Minimally Invasive Surgery/Bariatric Surgery

Neuroimmunology

Neuro Movement Disorders

Neuropsychiatry

Physiatry Interventional Spine

Pediatric Dermatology

Psychopharmacology



SOM 13-15

Academic Departments

Almost four decades ago, UMass Medical School held commencement ceremonies for its first class. Since then, more than 3,500 students have graduated to become health care professionals in virtually all fields of medicine and research. As an institution dedicated to the highest academic and ethical standards, we expect our students to be effectively prepared for the world of health care, which is changing at an unprecedented rate. To help students hone those skills required in the complex health care environment of the 21st century, UMMS has assembled a superior, dedicated faculty, supported by a strong foundation of academic departments that are continually evolving to meet the needs of our medical students, so they may realize their full potential as practitioners and researchers.

Anesthesiology Biochemistry & Molecular Pharmacology Cancer Biology Cell and Developmental Biology Emergency Medicine

Family Medicine & Community Health Medicine

Cardiovascular Medicine

Dermatology

Diabetes

Endocrinology & Metabolism

Gastroenterology

General Internal Medicine

Geriatric Medicine

Hematology/Oncology

Hospital Medicine

Infectious Disease & Immunology

Medicine/Pediatrics

Palliative Medicine

Preventive and Behavioral Medicine

Pulmonary, Allergy & Critical Care

Renal Medicine

Rheumatology

Transfusion Medicine

Microbiology & Physiological Systems

Molecular Medicine

Neurobiology

Neurology

Neurosurgery

Obstetrics & Gynecology

Ophthalmology

Orthopedics & Physical Rehabilitation

Otolaryngology

Pathology

Pediatrics

Psychiatry

Quantitative Health Sciences

Radiation Oncology

Radiology

Surgery

Bariatric Surgery

Cardiothoracic Surgery

General Surgery

Minimally Invasive Surgery (Endosurgery)

Neurosurgery

Organ Transplantation

Pediatric Surgery

Plastic & Reconstructive Surgery

Surgical Oncology

Thoracic Surgery

Trauma and Surgical Critical

Care Services

Vascular Surgery

Urology

Information in this section is provided by the departments and the Office of Faculty Affairs; it is current as of March 2013.



Anesthesiology

Members of the Department of Anesthesiology are involved in teaching first- and secondyear students in the basic science fields of pharmacology and physiology.

The Department of Anesthesiology provides both third- and fourth-year medical students with a variety of educational experiences related to the perioperative management of patients.

Third-year students are able to take an introductory elective in clinical anesthesia of one week duration during their core surgical clerkship. Basic lectures on pre-operative assessment, choice of anesthesia agents and techniques of administration are presented during these rotations. In addition, fundamentals of airway management, endotracheal intubation, regional and invasive monitoring are taught. These rotations also focus on the pharmacology and physiologic alterations associated with the administration of an anesthetic. Students are exposed to the techniques of general anesthesia administration as well as to a range of regional anesthetic procedures, including spinal, epidural, intravenous and peripheral nerve blocks. Students learn ancillary methods of patient management during surgery, such as fluid and electrolyte replacement, acid base balance, controlled hypotension and cardiopulmonary bypass. Students who have completed the introductory elective may take an additional week of a Flexible Clinical Experience (FCE) in a variety of subspecialty areas including cardiac, acute pain, pediatrics, neuroanesthesia, chronic pain, obstetrics and critical care. Students who were unable to take the introductory elective may take it as part of the FCE.

Fourth-year elective rotations are designed to meet the needs of the medical student who is interested in entering the field of anesthesiology. In addition to required rotation time at the UMass Memorial University Campus, students are given the option of rotating at any or all of our other residency training sites, in order to gain an exposure to a wide variety of anesthesia clinical settings. Sites include the UMass Memorial Hahnemann Campus for

ambulatory/regional anesthesia experience, the UMass Memorial Medical Center, Memorial Campus for obstetric anesthesia and chronic pain management experience and the University Campus SICU.

A fourth-year student rotation focused on the management of critically ill surgical patients is also available. In addition, students have the option to participate in clinical research. Third- and fourth-year students have worked with various faculty members to conduct research and have presented their research findings at regional and national meetings.

We welcome students to spend time with us and learn about the intricacies of anesthesiology as well as the multiple career paths available within the specialty.

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Professor

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Associate Professor

Jens M. Walz. MD*

Clinical Associate Professor

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Elifce O. Cosar, MD
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Farajallah Habib, MD*
Robert B. Hennessy, MD*
John Pullerits, MD*
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Hyun Kee Chung, MD
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Gilbert A. Fishbein, MD
Chandra S. Joshi, MD

Issam Khayata, MD*

Diana I. Kouznetsov, MD

Robert E. Lee, MD

Astrid E. Liland, MD

Eileen E. Maltais. MD

Theofilos P. Matheos, MD

Raimis Matulionis, MD*

Susanne Muehlschlegel, MD, MPH*

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Costin C. Negroiu, MD

Alan Orquiola, MD

M. Richard Pavao, MD

Robert I. Richmond, MD*

Ronald B. Rubin, MD

Steven D. Salt, MD

Shaheen F. Shaikh, MD

Zafar I. Siddiqui, MD

Nathanael A. Slater, DO

Victorija L. Smith, MD

Spiro G. Spanakis, DO*

Rebecca A. Zanconato, MD*

Maksim Zayaruzny, MD*

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Clinical Associate Professor

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Assistant Professor

Rene Aillon, MD

Mahmoud Aliouche, MD

Arnel Almeda, MD

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Agatha Anna. Boland, MD

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Gabriella Kovi, MD

Gordan Nicholas Kuhar, MD

Tanya Lucas, MD
Talal Makkaoui, MD
Robert Malinowski, MD



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Mohammed Mushtaque, MD
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Raymond G. Sohl, MD
Borovann Ung, MD
Mark P. Vanden Bosch, MD
Anil M. Vyas, MD

Research Assistant Professor
Albert Shahnarian, PhD

Instructor

Carl Schwartz, MD

Biochemistry & Molecular Pharmacology

Biochemistry & Molecular Pharmacology's notable faculty include:

- two Howard Hughes Medical Institute Investigators; a recipient of the Schering-Plough Award from the American Society for Biochemistry and Molecular Biology;
- a Pew Scholar and a W. M. Keck Foundation Distinguished Young Scholar:
- two recipients of the Burroughs
 Wellcome Fund Career Awards in
 Biomedical Sciences;
- investigators awarded a second fiveyear, \$8.5 million NIH program grant focused on drug resistance in HIV protease and rational inhibitor design;
- a recipient of the Young Investigator Award from the American Society for Biochemistry and Molecular Biology;
- a recipient of the William C. Rose Award from the American Society for Biochemistry and Molecular Biology;
- a chair who served a two-year term as president of the Protein Society and is currently the chair of the Public Affairs Advisory Committee for the American Society of Biochemistry and Molecular Biology.

The Department of Biochemistry & Molecular Pharmacology provides medical students with an understanding of the molecular mechanisms underlying normal and disease processes in humans as well as of the fundamental principles and biochemical and physiological bases of drug action. This is accomplished through the offering of two first-year courses: the Building Working Cells and Tissues course and the Principles of Pharmacology course.

The Building Working Cells and Tissues course is designed to incorporate the fundamental concepts of biochemistry in a series of lectures, clinical correlations, medical vignettes, problem-solving sessions and problem-based cases. These concepts are integrated with those from cell physiology and histology to provide students with a comprehensive understanding of the structure and function of cells and tissues.

The Principles of Pharmacology course familiarizes students with basic pharmacology concepts (pharmacokinetics, pharmacodynamics, drug metabolism, toxicology) and introduces drugs affecting the autonomic nervous system (muscarinic, nicotinic and adrenergic drugs). These drugs are also used to explore the concepts of mechanism of action, clinical use and adverse effects, thereby providing a framework for the learning of additional drugs in subsequent courses.

Professor and Chair

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Professor Emeritus

Sumner H. Burstein, PhD

Professor

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Michael P. Czech, PhD*
Roger J. Davis, PhD*
Job Dekker, PhD
Mark Dershwitz, MD, PhD*
Stephen J. Doxsey, PhD *
James Reid Gilmore, PhD
Heinrich Gottlinger, MD, PhD*
Michael R. Green, MD, PhD*
Lawrence Hayward, MD, PhD*
Yicktung T. Ip, PhD*
Kendall L. Knight, PhD
David Lambright, PhD*
Jose R. Lemos, PhD*
Shan Lu, MD, PhD*

Jeremy Luban, MD* Martin G. Marinus, PhD John R. McCullough, PhD Melissa J. Moore, PhD Thoru Pederson, PhD Craig L. Peterson, PhD Alonzo H. Ross, PhD William E. Royer, PhD Charles G. Sagerstrom, PhD Celia A. Schiffer, PhD Joshua Jay Singer, PhD* Lawrence Stern, PhD* John Vincent Walsh, MD* Zhiping Weng, PhD Zuoshang Xu, MD, PhD* Phillip D. Zamore, PhD

Research Professor

Scott A. Shaffer, PhD

Associate Professor

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Daniel N. Bolon, PhD
Lucio H. Castilla, PhD*
William R. Kobertz, PhD
Omanand Koul, PhD*
Haley E. Melikian, PhD*
Stephen C. Miller, PhD
Maryann Munson, PhD*
Oliver J. Rando, MD, PhD
Nicholas R. Rhind, PhD*
Sean P. Ryder, PhD
Scot Wolfe, PhD*

Research Associate Professor

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Assistant Professor

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David Grunwald, PhD
Gang Han, PhD
Brian Anthony Kelch, PhD
Andrei A. Korostelev, PhD
Francesca Massi, PhD
Konstantin B. Zeldovich, PhD

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Instructor

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Voluntary Faculty

Professor Emeritus
J. P. Flatt, PhD

Professor

Tariq M. Rana, PhD George Wright, PhD

Assistant Professor Balaji Bhyravbhatla, PhD

Instructor

Inna V. Shcherbakova, PhD

Cancer Biology

The Department of Cancer Biology is the nexus of cancer research at UMMS. Faculty members are engaged in research on fundamental mechanisms that lead to the onset, progression and dissemination of cancer, and on the translation of these mechanisms to improve the prevention,

detection and treatment of human cancers. The goal is to integrate the powerful and innovative biology that derives from the study of model organisms with the complex behavior of human tumors.

The department is a key component of the UMass Memorial Cancer Center of Excellence and home to several translational programs that bridge basic science and clinical cancer care, including the breast cancer, gastrointestinal cancer, genomic instability and leukemia programs. One of the most valuable resources is the tissue bank of the UMass Memorial Cancer Center, which accrues specimens from a variety of human cancers and provides them to researchers throughout UMMS as well as to other institutions.

Training the next generation of cancer researchers is a fundamental mission of the department. The cancer biology PhD program of the Graduate School of Biomedical Sciences is based here. This program provides students with outstanding training in cancer biology as well as an appreciation and understanding of cancer as a disease and the importance of translational research. This program brings together faculty and students from most of the basic science and clinical departments at the Medical School, and

it fosters the role of the department as the center of cancer-related activities on campus. We are also proud to have a training grant from the National Cancer Institute that funds both pre-doctoral students and post-doctoral fellows throughout the school.

Professor and Chair

Arthur M. Mercurio, PhD, ad interim

Professors

Eric H. Baehrecke, PhD
Andreas Bergmann, PhD
Chung-Cheng Hsieh, DSc
Stephen N. Jones, PhD*
Michelle A. Kelliher, PhD*
Peter E. Newburger, MD*
Alonzo H. Ross, PhD*
Leslie M. Shaw, PhD
Janet Stavnezer, PhD*

Research Professor

Hira Lal Goel, PhD* Paul W. Mak, PhD

Associate Professor

Ingolf M. Bach, PhD*
Sharon B. Cantor, PhD
Lucio H. Castilla, PhD*
Jeanmarie Houghton, MD, PhD*
Stephen R. Lyle, MD, PhD*
Merav Socolovsky, MD, PhD

* joint appointment



UMMS again ranked in top 10 nationally for primary care education

UMass Medical School was ranked ninth in primary care education among 126 medical schools and 23 schools of osteopathic medicine surveyed by weekly news magazine *U.S. News & World Report* in its 2014 edition of the "Best Graduate Schools" issue. UMMS has been listed near the top of the category since 1994 when the magazine began publishing the rankings. Of note, UMMS is the only school in the top 50 that accepts only in-state students into its medical degree program.

"UMass Medical School's consistently high ranking is a reflection of our dedication to our mission and the faculty's unwavering commitment to providing an outstanding education to our students," said Chancellor Michael F. Collins. "As we enter a period of unprecedented change in health care, the part our medical school, faculty and students play in shaping this future has never been more essential."

The School of Medicine, which had accepted just 100 students per year since the 1970s, recently expanded the class size to 125 to help increase the pool of physicians, particularly primary care providers, trained to meet the needs of the commonwealth and the nation. Traditionally, more than 50 percent of each year's graduates enter a primary care residency program. In addition, more than half of each class stays in the state for residency, totaling 260 new residents in the last five years alone.





Assistant Professor

Craig J. Ceol, PhD*
David A. Guertin, PhD*
Brian Lewis, PhD*
Junhao Mao, PhD
Karl J. Simin, PhD

Instructor

Seema Paliwal, PhD

Voluntary Faculty

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Instructor
David S. Garlick, DVM

Cell and Developmental Biology

The Department of Cell and Developmental Biology (CDB) offers exceptional strengths in the analysis of cell structure and function, with many cutting-edge research projects in the areas of cell structure and dynamics or in epigenetics and developmental biology. Developmental cell biology is a resurgent area of research, which is key to the promise of regenerative medicine. Much current research in the department relates to fundamental questions of how cells with the same genome can give rise to the varied cell-types and associated structures that comprise a whole organism. These questions are central to understanding not only normal development, but also stem cell biology, cancer, and a variety of specific human genetic disorders.

Examples of ongoing projects include studies of cell cycle control (in normal cells, cancer and cell senescence), reproduction and early embryogenesis, musculoskeletal and bone biology, and neurogenesis. Several CDB investigators have strong programs in transcriptional control and epigenetic regulation, particularly as it relates to nuclear structure, genome organization and chromosome biology. Current research has impact for numerous diseases, including cancer, Down syndrome, Alzheimer Disease, Facioscapulohumeral muscular dystrophy,

skeletal disorders, congenital blindness, infertility, and includes novel approaches to gene therapy.

Currently the CDB is host to a number of specialized centers that serve UMMS, including the electron microscopy, confocal microscopy and transgenic animal modeling core facilities, as well as the broader scientific community, as exemplified by the International Stem Cell Registry. The CDB is the home to an NIH training grant in reproductive biology, and our department also hosts and recently initiated the crosscampus Epigenetics Club, which has drawn wide interest. In addition, our department proudly operates the Anatomical Gift Program, which coordinates the donation and distribution of bodies that are such a critical resource for medical teaching, and research.

The department has exceptional accomplishments in education, and its superb teaching faculty members have attained national distinction in medical education, and are consistently recognized by awards for excellence and innovation in teaching and curriculum development. Faculty train medical, graduate and postdoctoral students in subjects ranging from molecular cell biology to human genetics, organ biology and neuroanatomy. In addition to several Advanced Topics Courses, CDB faculty are responsible for courses that include Building Working Cells and Tissues, Principles of Human Genetics, and Development, Structure and Function (histology, anatomy, embryology, physiology, imaging), and Brain: Nervous System and Behavior. Thus, CDB faculty provide a unique resource for students and trainees seeking to gain insights for pursuing careers with a teaching component or focus. Our graduate program aims to provide an exceptionally strong environment to train PhD students not only as researchers, but also as educators, and to prepare students for a diversity of careers in science.

Overall, research in the CDB seeks to advance discovery in basic biological processes with relevance to biomedicine and clinical/translational medicine. In addition to top-line imaging and structural analyses, research incorporates innovative cellular, biochemical, genetic and genomic or bioinformatic approaches to advance the

understanding of cell growth, differentiation and development, and the genetic and epigenetic contributions to tumorigenesis and other human genetic disorders. Medical students, graduate students and postgraduate physicians and scientists actively participate in CDB research programs, and interactivity is fostered via seminars, chalk talks and special interest clubs, such as the Program in Cell Dynamics or the Epigenetics Club. A priority is an environment that fosters multi-disciplinary team approaches, where shared concepts and expertise of physicians and scientists can expedite the translation of fundamental biological discoveries to clinical problems.

Professor and Chair

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Distinguished Professor

Craig Mello, PhD*

Professor

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Anne M. Gilroy, MA*
Peter Lawrence Jones, PhD
Daniel L. Kilpatrick, PhD*
Maryann Munson, PhD*
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Voluntary Faculty

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Assistant Professor

Jeanne D. Keller, MD*

Emergency Medicine

The Department of Emergency Medicine holds the distinction of caring for more than 185,000 patients annually; hosting both air and ground ambulance services; having several specialized divisions with fellows in Ultrasound, Disaster Medicine and Emergency Management, Toxicology, Prehospital Care, International Emergency Medicine and Global Health Administration; having a vigorous basic science and clinical research division with numerous grant-supported projects; and being one of the beneficiaries of a \$129

million renovation to create a state-of-the art emergency department on the University Campus of UMass Memorial Medical Center.

The knowledge of life supportive measures as well as the recognition and management of common medical emergencies are fundamental for all medical students. Emergency Medicine faculty are committed to these priorities by providing instruction through lectures, workshops and bedside teaching throughout the four year curriculum. Members of the department offer career guidance and support by acting as individual advisors and preceptors as well as holding panel discussions several times a year.

Emergency Medicine faculty direct a number of courses in the first and second-year curriculum, including: a) Integrated Case Exercises, which provides clinical case presentations as they relate to the foundational sciences such as anatomy and microbiology; b) Instruction in Basic Life Support and c) Enrichment Electives in Wilderness Medicine. The department also instructs with other disciplines in the Care for the Seriously III, Pharmacology, Anatomy and Cultural Awareness courses.

In the third year, students may enroll in Flexible Clinical Experiences at one week intervals to gain early exposure to Emergency Medicine. Students also spend a portion of their core surgery, inpatient medicine and pediatric outpatient experiences in the emergency department, participating in patient evaluations.

During the fourth year, students complete the newly developed required course Emergency Clinical Problem Solving. Goals are to learn the systematic approaches to diagnosis, treatment and disposition of emergencies, using advanced clinical reasoning when caring for undifferentiated patients, and to develop effective teamwork and communication skills. The course uses a combination of didactics, acute care clinical experiences and simulated encounters with procedures. For students exploring a career in Emergency Medicine, the department offers eight clerkships per month for fourthyear medical students to gain a broad understanding of acute care medicine. During this rotation, students play primary roles in patient assessment and care, develop

problem solving skills and learn a variety of procedures. Emphasis is placed on providing students with direct and expanded exposure to a wide range of conditions, including those that are life-threatening, and their immediate management. Prehospital experience, including paramedic ambulance rides, can also be included. The department also offers fourth-year electives in toxicology, emergency ultrasound and a research elective that pairs the student with one of our research faculty in the laboratory or clinical areas of interest.

At any time during medical school, students can explore a career in Emergency Medicine with faculty who are Longitudinal Program Preceptors or advisors, or by attending informative events coordinated with the student Emergency Medicine Interest Group (EMIG). Handson experiences in the simulation lab and suturing, airway, phlebotomy and splinting workshops are offered during the academic year. Additionally, research and international emergency medicine opportunities are available

Professor and Chair

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Professor

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Constance G. Nichols, MD
Peter G. Paige, MD
Marc C. Restuccia, MD
Eric W. Schmidt, MD
Stacy Weisberg, MD



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Veera R. Sudireddy, MD

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Jeanine Ann Ward, MD

Benjamin M. Terry, MD, MPH

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Benjamin Chin, DO
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Matthew Colin Dayno, MD
George E. Deering III, MD
Mark Robert Gallagher, MD
Kevin A. Kotkowski, MD
Melissa K. Leming, MD
Susan Y. Ly, MD
Virginia B. Mangolds, MS
Mark John Neavyn, MD
David St. Laurent, MD
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Bryan J. Wexler, MD

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Instructor

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Affiliate

Gideon Bosker, MD

Family Medicine & Community Health

The Department of Family Medicine & Community Health's faculty are

- recognized nationally and by the University for their commitment to public service and community health;
- pioneers in community-based medical education; and
- nationally renowned leaders in faculty development.

One of the founding departments of UMass Medical School, the Department of Family Medicine & Community Health offers students a wide variety of educational, research and service activities. Family Medicine faculty include a large number of family physicians working in a variety of settings across Central Massachusetts, ranging from urban and rural health centers to more traditional private practice settings.

Health care provided to underserved populations is also a major focus of the department. In Community Health, faculty interests include population medicine, prevention, evidence-based medicine, health care for the homeless and health policy. A leader in providing primary care and community-based educational experiences for the Medical School, the department's undergraduate programs include involvement in several courses during the first and second years, such as the Doctoring and Clinical Skills course and the Determinants of Health course.

In addition to serving as student advisors, faculty members precept students in the Doctoring and Clinical Skills course, placing students with a practicing family physician in the community for several sessions each semester, allowing them to interact with patients and develop their interviewing skills. For students interested in learning more about family medicine, the department supports a student-run Family Medicine Interest Group, which meets several times each year.

Research opportunities in the department are varied, and student involvement is supported by several summer work-study programs which have led to publication, national presentations and international experiences. Service opportunities include programs that link international health experiences with specialized educational tracks, and are designed to enhance cultural awareness.

The department's major predoctoral focus for the third year is sponsorship of the Family Medicine Core Clinical Experience. This required experience places students in community-based practices. Sites include community health centers, family medicine residency training sites, HMOs and private practices. The department also sponsors the four-year Pathway on Serving Underserved and Multicultural Populations and the Rural Health Scholars Program as well as graduate training programs in family medicine, sports medicine, preventive medicine and primary care psychology.

A variety of fourth-year electives are available to students interested in exploring additional areas of family medicine and community health. These include preceptorships in urban underserved areas, rural medicine, student health, Indian Health Service and global health, and electives in medical writing and scientific writing. A subinternship in Family Medicine is also available. Additionally, the department participates in the Senior Scholars Program, allowing students to choose from numerous areas of interest.

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N Lynn Eckhert, MD, MPH*
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SOM 13-15

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Medicine

The Department of Medicine consists of:

- eighteen subspecialty and general medicine divisions, each of which is successful and growing in key areas, including clinical practice, teaching and research:
- more than 800 full- and part-time faculty members; and
- the major expansion of centers of excellence programs in cancer, heart and vascular, musculoskeletal disease and diabetes.

The Department of Medicine participates extensively in and promotes broadly the education of medical students in several venues and across the undergraduate curriculum by fostering faculty leadership as course directors, classroom teachers, inpatient and outpatient clinical educators, mentors and advisors, and as lecturers in clinical and basic research seminars.

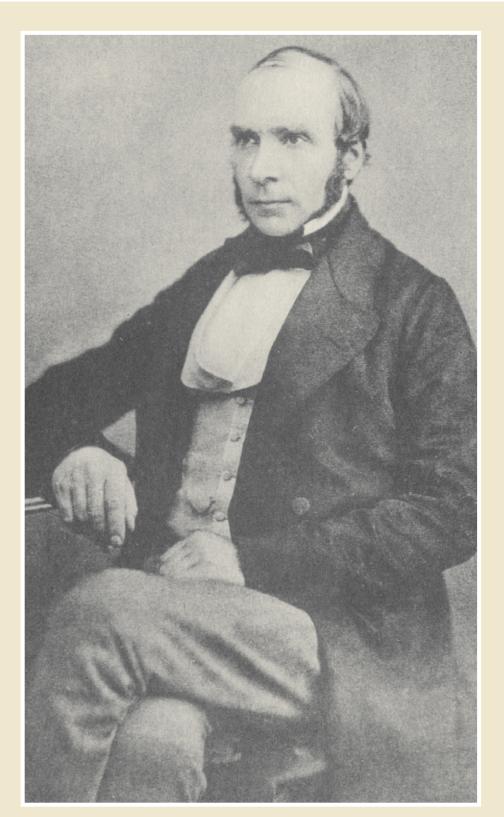
Department faculty teach students to develop a comprehensive and in-depth understanding of the pathophysiology of disease; the techniques for history taking, physical examination and generation of a differential diagnosis and management plans; the impact of illness on the patient and family; and wellness promotion and disease prevention. Throughout the four-year

curriculum, the department works to ensure that students are well-trained in general internal medicine, are exposed to key aspects of the subspecialties of Medicine and are prepared clinically and academically for internship and residency in all disciplines.

The Department of Medicine introduces first-year students to medical interviewing and clinical problem-solving in the Doctoring and Clinical Skills course. In the Longitudinal Preceptorship Program, first-year students serve as observers in general internal medicine offices and participate in the first phase of Physical Diagnosis, which emphasizes normal physical findings and their relationship to anatomy and physiology. Department of Medicine faculty also participate in the medical student Learning Communities as House Mentors and Subspecialty Advisors over the course of their training.

Faculty members are involved extensively in the Foundations of Medicine (FOM) curriculum. They direct and staff the Doctoring and Clinical Skills 2 course, wherein students begin to develop clinical skills, including the generation of problem lists, differential diagnoses, management plans, admission notes, medical orders and progress notes as well as critical analysis and use of medical literature. In addition, department faculty lead and teach in FOM 1 and 2 courses, including Building Working Cells and Tissues, Cancer Concepts, Infections, Patients, and the Organ Blocks. Faculty members also teach in electives in Caring for the Seriously III and Therapeutics.

Third-year students participate in a comprehensive clinical experience in Medicine. Inpatient rotations allow each student to experience tertiary care medicine at the UMass Memorial Medical Center University Campus and care of more common medical problems at a community hospital. An ambulatory rotation allows students to work closely with primary care internists in office or outpatient clinic settings. A rigorous core curriculum is provided through regularly scheduled conferences and seminars. The opportunity for flexible clinical experiences in medical subspecialties are provided in medicine. A senior geriatrician is director of the Core Clinical Curriculum Assessment



Elective views medical advances through history's lens

Why would students training for a future at the cutting edge of health care want to look back in time? For those who understand that the history of medicine holds useful lessons for their profession, the History of Medicine elective at UMass Medical School is a valuable course selection.

"Through a better understanding of medical history, students can gain needed perspective on the social, professional, economic and moral climate in which they will be practicing," agreed course co-founder Ellen More, PhD, professor of psychiatry and head of the Office of Medical History and Archives at the Lamar Soutter Library. "We want students to see the history of medicine as something that contributes to their own sense of professional development, and helps them understand their own place in medical history."

The History of Medicine seminar series is an optional enrichment course offered as a pass/ fail credit elective to students in the School of Medicine and a non-credit elective for Graduate School of Biomedical Sciences and Graduate School of Nursing students. This year's topic was infectious disease, as illustrated in the book Better: A Surgeon's Notes on Performance, by physician and medical writer Atul Gawande, MD. In the book, Dr. Gawande documents how doctors strive to become better at what they do—often in matters of life or death.

Examples included ingenuity in ancient China's attempts at a smallpox vaccine; the diligence of 19th century British physician John Snow, known as the father of modern epidemiology because he figured out how to contain a cholera epidemic; and doing right despite widespread panic to learn as quickly as possible how HIV spreads—and doesn't spread—so that nurses and doctors could provide care, and scientists could fast-track discovery of the lifesaving retroviral drugs.





(CCCA) program and directs curriculum integration in the UMMS Simulation Center.

The majority of fourth-year students select Medicine as the discipline for their required subinternship experience; this inpatient block provides students with more advanced, challenging and responsible roles in patient management than the third-year Core Clinical Experience. The department provides electives for fourthyear students in a variety of disciplines, including cardiovascular medicine, dermatology, diabetes, endocrinology, gastroenterology, general medicine/primary care, geriatric medicine, hematology/ oncology, infectious diseases, preventive/ behavioral medicine, pulmonary medicine, renal medicine, rheumatology and intensive care medicine. Many creative Flexible Clinical Experiences have also been created for medical students to have experiences in a broad range of topics to include Primary Care Practice Management and Quality Improvement. Research opportunities are provided in medical subspecialties and general medicine through the Senior Scholars Program. The department encourages students to participate in laboratory-based and clinical research projects during their time in medical school. A broad variety of research opportunities are available with scientists and clinical investigators in the Department of Medicine, with robust science and discovery programs in basic, clinical and translational research areas.

Chair and Professor

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Professor Emeritus

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Professor

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Neil Aronin, MD*
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Lori Etzel Pbert, PhD

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The choice of a White Coat helper can be tough, but meaningful

When first-year School of Medicine students cross the stage to be presented with the symbolic mantle of their profession at the White Coat Ceremony, they are helped by two people: a UMMS Learning Community mentor and another meaningful person in their lives they've chosen themselves—someone whose support they want to acknowledge in a very public way. Choosing that one person can be a tough decision for some students, but one that adds to the significance of the event.

Evan Gale chose his grandmother, Shoshana Gale, who is in her late 80s, to help him with his white coat because she is the matriarch of a family deeply involved in the health care field. A former social worker, she is the glue that keeps his family together, he said.

"I don't want to speak for her, but I think she's overjoyed. I'm so glad she's up for doing it," said Gale. "Whether she knows it or not, she was responsible for encouraging the critical thinking and discussions around health care in our family" that inspired him to become a doctor.

MD/PhD students Asia Matthew and her twin sister Ashley will be putting a twist on the tradition by helping each other with their coats.

"We've been together all our lives, even from the womb, so we've always had each other's support. We decided we'll robe each other to the finish," said Asia. The choice provided some logistical issues as students and helpers are paired up prior to arriving on stage, so the sisters received special rehearsal time to iron out the details.



Sometimes deciding between two equally important people can be so difficult that it's best to let them work it out themselves, as Gianna Wilkie discovered. She had her parents decide which of them would get the honored role.

"My mother told my father she has known me for nine months longer, so she should get to do it," said Wilkie. "He agreed, but he said that this was the only time she could use this rationale for any future decisions."

A relatively new tradition for medical students, the White Coat Ceremony was started in 1993 by the Arnold P. Gold Foundation at Columbia University College of Physicians & Surgeons. The tradition emphasizes the importance of both scientific excellence and compassionate care for the patient, according to the foundation.





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Microbiology & Physiological Systems

Microbiology & Physiological Systems features:

- research focused on specific genes that regulate disease processes, host defense mechanisms and basic cellular controls;
- investigators who exploit classic, molecular and genomic approaches to the genetics of several model systems;
- a multifaceted research approach designed to understand normal and dysfunctional molecular and cellular mechanisms in human physiology and disease in all organs of the body;
- faculty members internationally known for their expertise in bacteriology, virology, molecular biology, immunology, neural science, reproduction, aging, cell growth and cancer, stem cell research, cardiovascular physiology, endocrinology, smooth muscle biology and contractile proteins; and
- excellence in integrative physiological and microbiological education of medical and graduate students that is essential to fostering translational research involving physicians and researchers and has been consistently recognized by numerous teaching awards

Faculty in the Department of Microbiology & Physiological Systems are extensively involved in the leadership and teaching of microbiology and physiology, providing students with the basic knowledge necessary to understand and intervene in disease processes. Much of this teaching takes place in Foundations of Medicine (FOM) 1 courses, in interdisciplinary collaboration with faculty in other basic science and clinical departments. A key underlying tenet of the department's educational approach is that the practice of medicine will be linked



more and more closely with the expanding knowledge of basic biological phenomena.

Accordingly, in the Development Structure & Function course and the Building Working Cells and Tissues course, department faculty teach medical students the fundamental aspects of physiology. This knowledge serves as the foundation for understanding the functional basis of human health and disease-a foundation that students need as they prepare to become physicians and lifelong learners. Coursework emphasizes the physical and biochemical principles that govern the function of various cell types and organ systems—understanding these principles is far more important for understanding physiological and pathophysiological processes than rote memorization of facts. In the FOM curriculum, the teaching of human physiology strikes a balance between broad coverage and in-depth analysis of certain topics that are particularly illustrative of basic principles or methods. In observance of the same principles, part of the Infections course covers the basic biology of bacteria and viruses, emphasizing the molecular mechanisms of microbial processes that are targets or potential targets for antibacterial or antiviral chemotherapy. In coursework, students learn about the pathogenic mechanisms employed by microbes to establish human infection, cause tissue damage and spread to other hosts. Finally, the acquired knowledge of the biology and pathogenic strategies of these microorganisms is used as a foundation for students to learn how to diagnose, treat and prevent human infectious disease

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Molecular Medicine

Molecular Medicine's stellar faculty includes:

- the co-recipient of the 2006 Nobel Prize in Physiology or Medicine;
- three Howard Hughes Medical Institute Investigators;
- the co-recipient of the 2008 Lasker Award for Basic Medical Research;
- two members of the National Academy of Science:
- two foreign members of the European Molecular Biology Organization; and
- · a fellow of the Royal Society.

Molecular Medicine is characterized by a diverse faculty of both basic biomedical scientists and physician-scientists. The program occupies its own modern 80,000-square-foot research building adjacent to the UMass Medical School campus—Biotech Two—and includes additional faculty appointments in the Program in Gene Function and Expression, the Program in Cell Dynamics, the Program in Bioinformatics and Integrative Biology, the Diabetes Center of Excellence, the RNA Therapeutic Institute and the Program in Systems Biology. The program's strategy for scientific development has been to assemble outstanding investigators with overlapping scientific interests who apply their unique knowledge to molecular mechanisms that underlie physiological processes and associated diseases. Areas of expertise include chemistry; structural biology; biochemistry; cell, developmental and molecular biology; cell signaling and regulation; genomics and proteomics; genetics; and immunology and virology. Molecular Medicine faculty are active in teaching these disciplines in both core and advanced courses to graduate and medical students.

The laboratory groups in the program are led by academic leaders in their respective fields of biology and medicine. Strong research programs related to Stem cell technology, RNA and cancer biology, AIDS, diabetes and obesity are also represented. The multidisciplinary nature of the program has led to scientific collaboration and diversity, providing an exceptional training ground for students and postdoctoral fellows alike.

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Usha Rajagopalan Jairaj Acharya, PhD Jennifer A. Benanti, PhD Michael A. Brehm, PhD* Michael H. Brodsky, PhD Craig J. Ceol, PhD* Thomas G. Fazzio, PhD Paul S. Furcinitti, PhD David A. Guertin, PhD* Aviva Joseph, PhD

Rene Maehr, PhD

Caterina Strambio De Castilla, PhD

Eduardo M. Torres, PhD

Amy K. Walker, PhD

Yong Xu Wang, PhD

Maria L. Zapp, PhD*

Research Assistant Professor

Dean. Bellve, PhD Anil K. Chawla, PhD Darryl Conte, PhD Philip J. dilorio, PhD Kevin E. Fogarty, MS*

Susan J. Gray, PhD

Weifeng Gu, MD, PhD

Adilson L. Guilherme, PhD

Norman J. Kennedv. PhD

Ellen Kittler, PhD

Ashwini Mishra, PhD

Serguei A. Popov, MD, PhD

John S. Reece Hoyes, PhD

Masaki Shirayama, PhD

Juerg R. Straubhaar, PhD

Rossella Tupler, MD, PhD

Joseph V. Virbasius, PhD

Research Instructor

Maria Gonzalez Perez, PhD Yoshiko Usami, PhD

Instructor

Sanchita Bhatnagar, PhD Maria Jose Duenas Decamp, PhD Randall Friedline, PhD Olga Gealikman, PhD Dae Young Jung, PhD Agata Jurczyk, PhD

Caroline Morel, PhD Dongning Pan, PhD

Paul Peters, PhD

Aleksandr Repik, PhD

Jovenal T. San Agustin, PhD*

Corey L. Smith, PhD Shinya Watanabe, PhD

Ping Xu, MD, PhD

Chaoxing Yang, PhD

Zhong Yu, MD, PhD

Voluntary Faculty

Professor

Juleen R. Zierath, PhD

Assistant Professor

Andrea S. Foulkes, PhD

Research Assistant Professor Alexey Dmitriyevich Wolfson, PhD



Neurobiology

Neurobiology faculty conduct cutting-edge research into the:

- assembly and plasticity of synapses, the structures through which nerve cells communicate with each other;
- development and function of glia that may identify targets for pharmaceutical intervention in spinal cord injuries or neurodegenerative disease;
- mechanisms of neural circuitry formation and its impact on the developing brain;
- mechanisms of learning and memory in fruit flies and behavioral plasticity in worms, and their relevance to those of humans; and
- mechanisms of circadian rhythm generation in insects and mammals that are therapeutic targets for some sleep and psychiatric disorders.

Brain function embodies the very essence of the human experience as well as that of our relatives in the animal kingdom, and its study represents one of the most exciting scientific endeavors. Established in 2001, the Department of Neurobiology is the driving force for basic neuroscience research on campus. The department's activities encompass the study of fundamental neural mechanisms, with implications for disorders ranging from Sudden Infant Death Syndrome to Alzheimer's disease.

Department faculty are focused on elucidating fundamental mechanisms of brain function using model genetic systems and unconventional models, such as the monarch butterfly. These research results will add to the understanding of the roles of genes and their protein products in normal neuronal and glial function, with the goal of finding innovative therapies to prevent, combat and cure neurological and neuropsychiatric disorders.

Chair and Professor

Steven M. Reppert, MD

Professor

Vivian Budnik, PhD
David R. Weaver, PhD

Associate Professor

Patrick Emery-Le, PhD Marc R. Freeman, PhD Mary E. Lane, PhD Hong-Sheng Li, PhD Carlos Lois. MD. PhD

Assistant Professor

Mark Alkema, PhD Claire Y. Benard, PhD Michael M. Francis, PhD Yang Xiang, PhD Motojiro Yoshihara, PhD

Neurology

Our faculty experts are currently engaged in a number of funded research programs, including investigations into the:

- genetic defects that cause familial forms of Lou Gehrig's disease (amyotrophic lateral sclerosis, or ALS);
- molecular events that trigger nonfamilial forms of ALS and drug screening for small molecules that ameliorate ALS;
- genetic basis and approaches
 to therapy of selected other
 neuromuscular disorders, including
 a form of limb girdle muscular
 dystrophy (LGMD-2B, also known
 as Miyoshi myopathy), periodic
 paralysis, hereditary sensory and
 autonomic neuropathy (HSAN1) and
 a form of adrenoleukodystrophy
 (Lorenzo's Oil disease) known as
 adrenomyeloneuropathy;
- physiology of the visual cortex;
- pathology, genetics and biology of other neurodegenerative disorders, with a particular focus on Alzheimer's disease;
- molecular control of circadian functions and the molecular genetics of membrane channel function and dysfunction;
- pathophysiology of disorders of the central and peripheral autonomic nervous systems;
- therapeutic approaches to multiple sclerosis; and
- pathobiology of brain tumors.

The University of Massachusetts Medical School's Department of Neurology is the largest training, research and clinical neurology facility in central New England. The department acquaints SOM students with diseases that affect the nervous system and equips them with fundamental skills in clinically relevant neuroscience, neurologic diagnosis and management. Because neurological disorders are common among patients in virtually every medical specialty,

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this instruction is designed for students entering all branches of medicine.

During the Foundations of Medicine curriculum, medical students learn neuro-anatomy and physical diagnosis in courses that stress clinical correlations of neuro-anatomic principles and are introduced to nervous system disorders, emphasizing observational methods, regional problems, specific diseases, clinical patterns and neuropathological correlates as well as clinical neurological problems.

The major portion of clinical neurology instruction is carried out during the clinical years as a part of the neurology clerkship. Students experience clinical neurology through the inpatient, consult or ambulatory experiences at one of the teaching hospitals affiliated with the Medical School. Seminars and lectures discussing major clinical problems are conducted, and elective programs are offered in the department's clinical and basic research laboratories.

Students interested in careers in neurology are encouraged to join the Student Interest Group in Neurology (SIGN) or work as a summer trainee in the Multiple Sclerosis clinic.

In 2006, the department received national recognition by the Association of University Professors of Neurology (AUPN) for the highest portion of medical school class members entering neurology, as compared to all other medical schools in the United States.

The Neurology Residency Program is clinically and intellectually at the very center of our department, and the training of new neurologists is among our most important and most enjoyable responsibilities. Designed to encompass both the richness of traditional clinical neurology and the excitement of contemporary clinical neuroscience, our goal is to train superb clinical neurologists who are experienced in the principles of neurological disease and are also well-educated clinical neuroscientists informed about the structure, function and molecular physiology of the nervous system.

This is an exciting time in neurology, as powerful new technologies in basic neurobiology and the clinical neurosciences have rapidly improved our understanding of neurological illnesses. Prospects have never been better for finding effective new treatments for even the most devastating neurological disorders. While our program centers on a first-rate core clinical experience, our residents and faculty are encouraged to continually advance their training through customized residency programs, specialized fellowships and research opportunities. The laboratories of our skilled faculty explore the exciting and growing fields of neurology, as new technologies accelerate our understanding of the central nervous system and the diseases that plague it.

Faculty basic research interests include the neurophysiology of vision; the biology of respiratory and circulatory control; the molecular genetics, structure and function of nerve and muscle ion channels; approaches to understanding the causes and therapies for neurodegenerative disorders, with an emphasis on ALS and Alzheimer's disease; the molecular basis of circadian rhythms and neural stem cell biology; stroke and penumbral survival; pathogenesis of human development disorders, especially brain dysfunction; and autonomic function pathogenesis. Clinical research interests include the neurology of aging and Alzheimer's disease and dementia, epilepsy, Parkinson's disease, multiple system atrophy, multiple sclerosis, neuro-oncology, neuromuscular disorders and cerebrovascular disease.

Professor and Chair

Robert H. Brown, DPhil, MD

Professor

Sheldon Benjamin, MD*
David A. Drachman, MD
Marc Fisher, MD*
Susan B. Gagliardi, PhD*
Fen-Biao Gao, PhD
Edward I. Ginns, MD, PhD*
Lawrence Hayward, MD, PhD*
Robert J. Milner, PhD
Majaz Moonis, MD*
David Paydarfar, MD
Daniel A. Pollen, MD
William J. Schwartz, MD

Thomas W. Smith, MD* Ajay K. Wakhloo, MD, PhD*

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Associate Professor

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Paul C. Marshall, MD*
Peter Novak, MD
Miguel S. Sena Esteves, PhD

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Ursula E. Anwer, MD Isabelita Bella, MD Nancy M. Fontneau, MD Neeta Garg, MD Carolina Ionete, MD, PhD Ann L. Mitchell, MD Catherine A. Phillips, MD Lan Qin, MD, PhD Paula D. Ravin, MD

Assistant Professor

Josna Adusumilli, MD Alan J. Bell, MD Darvl A. Bosco, PhD* Raphael A. Carandang, MD* Felicia Chu, MD Janice Ann Dominov, PhD Jordan H. Eisenstock, MD* Mark R. Gibson, MD Richard Paul Goddeau Jr., DO Shirin Haddady, MD* Wiley R. Hall, MD* Nils Henninger, MD* Jaya B. Kumar, MD Jennifer Dunbar Moodie, MD Susanne Muehlschlegel, MD, MPH* Shashidhara Nanjundaswamy, MD Audrey J. Painchaud, MD Grazyna Pomorska, MD Colin C. Quinn, MD, MSPT Muhammad Ramzan, MD Johnny S. Salameh, MD Elisabeth Salisbury, PhD Ellen Salurand, MD Naren B. Sodha, MD Mikhail Vvdrin, MD, PhD

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Research Assistant Professor

Premananda Pai Indic, PhD

Instructor

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Affiliate

Elizabeth W. Henrikson, PhD*

Voluntary Faculty

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Assistant Professor

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Research Assistant Professor Andrzej Przybyszewski, PhD

Paul D. Wright, PhD

Affiliate

Zahra Ayub, MD

Neurosurgery

The Department of Neurosurgery, previously a specialty division within the Department of Surgery, became an independent department in 2012. This new status aids in the recruitment of high quality faculty, the reestablishment of the neurosurgery residency program, the formation of the Neurosciences Center of Excellence and the allocation of resources to expand our clinical programs and research initiatives.

Department faculty are intimately involved in leading research related to RNAi-based gene therapy for neuro-degenerative disease, brain cancer therapeutics, cerebrovascular pathology and minimally invasive surgery. Supported by National Institutes of Health grants, other funding organizations and private donations, faculty regularly publish findings in peer-reviewed journals as contributing members in highly collaborative team

science. Our spirit of innovation has resulted in several patent applications over the last few years.

The Department of Neurosurgery offers clinical rotations for medical students during their third year Core Clinical Experience and the fourth year electives. Students participate fully in the patient care activities from the outpatient clinics through the operating room and all didactic conferences including neuroradiology, critical care, tumor board and stroke. Additional global health and independent study opportunities are available for undergraduate, graduate and medical students in both clinical and basic science areas. We regularly support Senior Scholar electives and tailor sub-internship experiences to enhance student access to competitive graduate medical education opportunities.

Professor and Chair

Richard P. Moser, MD* ad interim

Professor

Oguz I. Cataltepe, MD*

Associate Professor

John P. Weaver, MD

Assistant Professor

Frederik A. Pennings, MD

Voluntary Faculty

Assistant Professor

Gerald T. Mcgillicuddy, MD

Arno S. Sungarian, MD

Affiliate

Julie G. Pilitsis, MD, PhD

Obstetrics & Gynecology

The mission of the Department of Obstetrics & Gynecology is to deliver exemplary patient care in ambulatory and inpatient settings while providing excellent education and cutting-edge research in obstetrics, gynecology and human reproduction. The primary objectives of the department are to develop clinical care programs that are high quality and patient-focused; perform research that improves quality of future care for our community; provide services that improve the quality of life in the community; train residents and fellows to be future leaders in obstetrics and gynecology; and offer students exposure to the academic and practical aspects of obstetrics, gynecology and related sub-specialties. OB/GYN faculty are committed to medical student education and are involved in first-year Learning Communities, physician skills course. second-year reproductive medicine course, third-year clerkship and fourth-year electives. The faculty and residents in OB/GYN will demonstrate to students the rewards of this surgical specialty, which allows long-term, compassionate care of the women in our community.

The department provides students with the opportunity to gain the knowledge and clinical skills that are fundamental to the practice of women's health. The Reproductive Medicine course, overseen by OB/GYN faculty, is taught in the second year and prepares students to consider health issues for both genders throughout their reproductive years. Also, the Maternal-Child Health Program allows students to have a longitudinal experience with individual patients during their pregnancy, delivery and early infant period. First- and second-year students are welcome to spend time in the Labor and Delivery unit observing residents and faculty as they interact with obstetrical patients. The major clinical experience for medical students occurs during the third-year Core Clinical Experience in inpatient and ambulatory settings. Opportunities are also available for a continuing relationship with a single mentor during medical school through the preceptorship component of the Doctoring



and Clinical Skills course. Fourth-year electives include general obstetrics and gynecology as well as intensive learning experiences in all of the subspecialty areas.

Students develop history-taking and physical examination skills in both obstetrics and gynecology and the field's four subspecialties. Communication, learning to be an educator and sensitivity to cultural issues are emphasized. The obstetric experience includes prenatal care, complicated pregnancy, normal and abnormal labor, childbirth and operative delivery. In gynecology, students learn about preventive reproductive health examinations, family planning and treatment of benign disease as well as cancers of the reproductive tract and infertility evaluations. The diagnosis and treatment of pelvic floor dysfunction and incontinence are also covered. The department offers fourth-year electives and clerkships in gynecologic oncology, urogynecology, reproductive endocrinology and infertility, maternal-fetal medicine, ambulatory obstetrics and gynecology, and a flexible elective that allows students to create their own experience in the field.

Students also participate in the educational components of the residency program. This program features innovative experiences in simulation; the gross anatomy laboratory for pelvic and perineal dissection; curricula in effective communication with patients and referring physicians, patients and staff; and Health Care Economics, which encompasses billing, coding and documentation, hospital and medical group economics, and state and federal health care policy and advocacy.

Obstetrics & Gynecology is actively engaged in research in the areas of cancers of the reproductive tract, infertility outcomes, pelvic floor disorders, urinary and anal incontinence, psychosocial stressors in pregnancy outcomes, weight gain and obesity in pregnancy and risk of hormonal contraceptives. Students are welcome to participate in clinical research with OB/GYN faculty, residents and fellows.

Professor and Chair

Julia V. Johnson, MD, MS

Professor Emeritus

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Thomas F. Halpin, MD

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Sharmilee B. Korets, MD

Tara Neubert Kumaraswami, MD

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Danielle Patterson, MD James William Pellegrini, MD* Alan Peter Picarillo, MD*

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Instructor

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Clinical Instructor

Tiffany M. Forti, MD Mary Elizabeth Gamache, RN, CNM, NP Julie M. King, RN, NP Kerri E. Osterhaus-Houle, MD Brenna W. Wiberg, MSN, NP

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* joint appointment * joint appointment



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Herbert M. Kantor, MD
Joan E. Lister, MD
Gretchen Loebel, MD
Farazeneh Nabizadeh, MD
Cassandra V. Service, MD

Instructor

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Peter C. Davidow, MD
Dina M. Deldon-Saltin, DO
Paul S. Dunn, MD
John Farricy, MD
Karen Ferroni, MD
Abraham Fischer, MD

Brenda Hallenbeck, MD Patrick P. Hogan, MD Diego S. Illanes, MD Karen K. Jeng, MD, MBA Jane A. Molinari, MD June O'Connor, MD Mary E. Scannell, MD Steven M. Solano, MD Elizabeth Kopin, MD

Affiliate

Karen Sue Ammerman, MD Michael N. Schatz, MD Susan Kraft, MD Don P. Deprez, MD

Ophthalmology

The Department of Ophthalmology is recognized for combining basic, translational and clinical research in clinical practice, including novel small molecules, gene therapy and stem cell therapy for retinal and optic nerve disorders.

The Department of Ophthalmology was re-established at UMass Medical School in 2009. The department includes state-of-theart basic research laboratories, where its staff performs biochemical research, particularly with retinal degeneration and related topics, to better understand the causes of eye diseases and help develop new treatments and potential cures. Students are encouraged to join the department in investigating these basic and clinical research efforts.

The department also provides comprehensive clinical ophthalmology

WooFoods aims to make the healthy choice the easy choice

The menu featured the Flying Rhino Café's hearty but healthy version of the restaurant's most popular dish, the Ivory Tusk—grilled chicken with caramelized onions and half the usual amount of American cheese on a whole grain wrap instead of Italian bread, accompanied by a crunchy broccoli slaw rather than the usual fries. For dessert, an elegant panna cotta and berry parfait from Sweet Worcester, featuring 75 percent fresh fruit, was low-fat, lightly sweetened and delicious.

Participants at a WooFood Town Hall meeting held in January at UMass Medical School enjoyed these tasty as well as healthful dishes contributed by WooFood-certified Worcester restaurants, while they learned more about the WooFood initiative to "make the healthy choice the easy choice" at local eateries.

Medical students Mitchell Li, SOM '13, Matthew DeWolf, SOM '14, and Adam Chin, SOM '14, founded WooFood in 2010 to bring a positive approach to improving public health that aligns the pleasure of dining out with healthful eating. WooFood does this by certifying restaurants and other dining establishments that are committed to putting food on their menus that is healthful as well as appetizing.

Eleven Worcester establishments have been certified in less than three years, making the WooFood logo a recognizable and reputable symbol



of a commitment to a business model that emphasizes patrons' health along with their palates.

"I was really impressed by how far WooFood had come since they started working in the past couple of years. The food served set an inspirational mood for the forum," said Abbot "Cotton" Widdicombe, SOM '15. "I could tell that the chefs enjoyed the creative challenge of adapting dishes or creating new ones to meet the WooFood criteria."





services, specializing in vitreoretinal diseases, glaucoma, macular degeneration and vascular diseases of the retina. Services include the latest technologies for imaging, perimetry and electrophysiology. Faculty are also developing international research and clinical trial collaborations with colleagues at major eye hospitals.

Chair and Professor

George K. Asdourian, MD ad interim

Assistant Professor

Mark D. Barsamian, DO Hemant Khanna, PhD Raymond G. Magauran, MD Patricia H. Peffer, MD Claudio Punzo, PhD

Voluntary Faculty

Clinical Associate Professor Edward L. Kazarian, MD*

Assistant Professor

Michael J. Bradbury, MD* Diane P. Karalekas, MD Frank J. McCabe, MD* Alan P. Moss, MD Pascale Perusse, MD Gisela Velez, MD, MPH, MA Joseph M. Williams, MD, PhD

Clinical Assistant Professor William M. Tang, MD

Affiliate

Brad J. Baker, MD
Melvyn H. Defrin, MD
Richard M. Eisenberg, MD
Denis J. Fitzgerald, MD
Jeffrey P. Gallo, MD
Robert Gise, MD
Jeffrey D. Levine, MD
Willard G. Rice Jr., MD
Susan M. Yeomans, MD

Orthopedics & Physical Rehabilitation

The Department of Orthopedics & Physical Rehabilitation features world-class, comprehensive and multidisciplinary subspecialty centers of excellence for central New England, including:

- Arthritis and Joint Replacement Center, a patient-centered program dedicated to arthritis and joint pain (Memorial Campus);
- Foot and Ankle Center, dedicated to treatment of the full range of foot and ankle conditions (University Campus);
- Hand/Upper Extremity Center, dedicated to the treatment of the full range of hand and upper extremity conditions (Hahnemann Campus);
- Pediatric Orthopedic Center, dedicated to the treatment of the full range of pediatric orthopedic conditions and injuries (University Campus);
- Sports Medicine Center, dedicated to the prevention, diagnosis and treatment of all athletic injuries (Hahnemann Campus);
- Spine Center, a state-of-the-art facility offering expert care for congenital, degenerative and traumatic spinal disorders in adults (Memorial Campus); and
- Trauma and Fracture Center, dedicated to the diagnosis and treatment of orthopedic injuries and fractures (University Campus).

The elective program in the Department of Orthopedics & Physical Rehabilitation provides students with an opportunity to observe and participate in a clinical mentorship with orthopedic surgeons. Students attend conferences and participate in the surgical, office and emergency practices of preceptors who practice at UMass Memorial Medical Center or in other communities throughout the state.

UMMS offers two electives that require medicine and surgery clerkships. The first, recommended for fourth-year students who

intend to pursue a residency in orthopedic surgery, is an in-depth course in musculoskeletal disorders, emphasizing inpatient and outpatient diagnosis and management of a wide variety of musculoskeletal disorders. Students will gain experience in diagnostic methods, surgical procedures, postoperative care and non-operative treatment of musculoskeletal conditions.

The second elective is recommended for fourth-year students who intend to pursue a residency other than orthopedic surgery, such as family practice, rheumatology, neurology, radiology, pediatrics, anesthesiology, physical medicine and rehabilitation, plastic surgery, emergency medicine, occupational medicine and infectious diseases. It is an in-depth and faculty-supervised overview of outpatient musculoskeletal problems that aims to develop skills in history taking, physical examination, and diagnosis and treatment of a broad spectrum of musculoskeletal diseases.

Professor and Chair

David Ayers, MD

Professor

Norman E. Beisaw, MD
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Thomas P. Goss, MD
Arthur M. Pappas, MD*
Faren H. Williams, MD

Clincial Professor

Patrick J. Connolly, MD Walter J. Leclair, MD

Associate Professor

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Brian D. Busconi, MD
Leslie R. Harrold, MD, MPH*
Marci D. Jones, MD
Jie Song, PhD*
John H. Stevenson, MD*

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Glen David Gaebe, MD Hwa Hsin Hsieh, MD Mark T. Kraus, MD Anthony S. Lapinsky, MD* David P. Magit, MD David A. Mazin, MD Jeffrey N. Metzmaker, MD Errol Mortimer, MD* Mathew J. Most, MD Abhav R. Patel, MD Mark D. Price, MD, PhD Joseph M. Pugleasa, MD Yvonne A. Shelton, MD* Judith A. Siegel, MD Debra Ann Twehous, MD John J. Wixted, MD Angela Z. Yang, MD, PhD

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Professor

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Instructor

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Affiliate

Peter P. Anas, MD Russell W. Cournoyer Jr., DPM John George, DPM Henry M. Toczylowski Jr., MD Joseph A. Veneziano, MD

Otolaryngology Head and Neck Surgery

With its clinical partner, UMass Memorial Health Care, Otolaryngology-Head and Neck Surgery features:

- a regionally renowned pediatric and adult cochlear implant program that provides complete evaluation screening, surgery and extensive rehabilitation services for patients with hearing disabilities;
- comprehensive multidisciplinary diagnosis and treatment of head and neck cancer;
- comprehensive surgical management of thyroid and parathyroid disease;
- state-of-the-art endoscopic sinus surgery;
- medical and surgical treatment of balance disorders;
- evaluation and management of tumors in the ear and temporal bone;
- evaluation and treatment of facial nerve paralysis;
- treatment of acute and chronic ear infection; and
- evaluation and surgical treatment of congenital ear malformations.

The Department of Otolaryngology-Head and Neck Surgery strives to acquaint students with the many clinical issues affecting the ears, nose and throat, including head and neck surgery, pediatric otolaryngology, otology and neurotology.

Attending staff will supervise the students during all clinical activities. Students are allowed increasing responsibility in accordance with their level of skills and fund of knowledge. Students are encouraged to participate in the full spectrum of patient care encompassed within the practice of otolaryngology. The attending staff member determines the degree of supervision indicated during a student's participation in any given clinical situation to maintain the highest standards of patient care.

In the third year, students rotate through the otolaryngology clinics during the subspecialty portion of their Surgery core clinical experience. The faculty also presents a didactic series on the principles of head and neck surgery. Included are lectures and case presentations highlighting the major subdivisions of general and pediatric otolaryngology, endoscopic sinus surgery, otologic and neurotologic and skull base surgery, cochlear implantation in children and adults, and head and neck oncologic surgery and reconstruction.

An elective fourth-year clerkship is also offered for interested students who intend to pursue a career in otolaryngology or who wish to enter other fields but develop and refine their otolaryngologic diagnostic skills. Students work in both the outpatient and inpatient setting, participating in diagnosis, treatment and management of otolaryngologic problems and in a wide variety of surgical procedures and postoperative management. Research electives are also available.

Students rotating through the Department of Otolaryngology-Head and Neck Surgery have a chance to be introduced to the six competencies required during future residency training:

- Patient care that is compassionate, appropriate and effective for the treatment of health problems and the promotion of health.
- Medical knowledge about established and evolving biomedical, clinical and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.
- Practice-based learning and improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care.
- Interpersonal and communication skills that result in effective information exchange and teaming with patients, their families and other health professionals.
- Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse patient population.



6. System-based practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care, and the ability to effectively call on system resources to provide care that is of optimal value.

Chair and Associate Professor

Daniel Y. Kim, MD*

Professor

Richard R. Gacek, MD*

Assistant Professor

Sarah S. Seo, MD Weiru Shao, MD, PhD*

Clinical Assistant Professor

Syed H. Kamil, MD

Voluntary Faculty

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Assistant Professor

Giulio I. Cavalli, MD James P. Hughes, MD David B. Wexler, MD Sarah Foster Poissant. PhD

Clinical Assistant Professor John A. Loiodice, MD

Affiliate

Min S. Ahn, MD John R. Bogdasarian, MD Andrea C. Chiaramonte, MD Frank Peter Fechner, MD Neri Holzer, MD Joseph H. Oyer, MD Jonathon Scott Sillman, MD

Pathology

Pathology faculty have been widely recognized for their commitment to medical students through a number of UMMS teaching awards, including the:

- Lamar Soutter Award for Excellence in Medical Education;
- Educational Achievement Star Award;
- Retired and Outstanding Medical Educator Awards; and
- Faculty Marshall Award.

The Department of Pathology offers medical students their first formal encounter with disease through an integrated pathology curriculum. This includes an introduction to the basic manifestations of disease at the cellular and tissue levels and an analysis of specific diseases as they affect all organs and systems. This "organ system" approach to disease is taught in an integrated manner with diverse clinical and basic science departments in the Organ System Diseases course. This course provides students with an in-depth understanding of disease by correlating underlying molecular mechanisms with structural, functional and clinical aspects.

Diseases of the nervous system are also taught as an integrated course (Brain: Nervous System and Behavior) with contributing departments that include psychiatry, neurology, pathology and cell biology. The Department of Pathology also plays a major teaching role in the integrated immunology curriculum (Host Defense and Blood course), providing students with an understanding of the basic mechanisms that protect the body against infectious agents and how these mechanisms contribute to diseases, including autoimmunity, immune deficiency and transplantation rejection.

Elective opportunities in various areas of Pathology are available to medical students. Students in their third year have the opportunity to take one week electives in pathology as part of the Flexible Clinical Experience course. Electives are also available in the fourth year (Advanced Studies) and are usually about four weeks in duration. Research experience is also available, primarily in Immunology.

Laboratories in the department are investigating the immune response to viruses and cancers, antigen presentation, T-lymphocyte activation and T-cell development. Clinical research is focused on the study of varied aspects of pathogenesis, disease and diagnostic pathology

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Pediatrics

Pediatrics is distinguished by:

- a special immunology clinic for children with HIV that provides access to state-of-the-art treatment;
- a cystic fibrosis center that treats more patients with the disease than any other facility in Central and Western Massachusetts;
- a 43-bed Newborn Intensive Care Unit that has earned benchmark status as a model for similar units worldwide; and
- a juvenile diabetes center that is the only program in Central and Western Massachusetts to be certified by the American Diabetes Association.

The Department of Pediatrics introduces students to the career of pediatrician. During the four years of medical school, students learn how to diagnose and manage acute and chronic illnesses that are commonly seen in infants, children and adolescents. Students are also exposed to the biopsychosocial and developmental aspects of pediatrics. The curriculum helps students acquire the necessary skills to establish rapport with children and their parents in order to obtain a meaningful history, conduct a thorough physical examination, manage clinical problems and serve as a child and family advocate. As a result of their pediatric experiences, students should be able to make an enlightened career choice concerning this specialty.

During the Foundations of Medicine curriculum, faculty members participate in interdepartmental lectures and conferences on neuroanatomy, genetics, nutrition, microbiology, hematology, immunology and behavioral sciences that incorporate clinical correlations with the basic science topics the students are learning; the biopsychosocial aspects of health and disease in infants, children and adolescents are woven into this series.

Department faculty have specific teaching responsibilities in the Doctoring and Clinical Skills course and as longitudinal preceptors. In addition, the department has developed an elective seminar in Teen Pregnancy, which has been well received by students.

The third-year Pediatrics Core Clinical Experience (CCE) emphasizes clinical problem solving in both clinical situations and conferences. The experience includes inpatient pediatric settings and primary care offices. Students use this experience to become familiar with the primary care and subspecialty nature of the field and the important role that the pediatrician plays in the physical and emotional development of children of all ages.

During the CCE, students participate as members of a health care team in a variety of community outpatient and inpatient settings, allowing them to apply their interviewing and clinical problem-solving skills in the health care of children. In addition, the department provides an opportunity for approximately 30 students to participate in a 12-week combined obstetrics and gynecology and pediatric/maternal-child health elective, during which the student is responsible for a woman's prenatal care as well as the health supervision of her infant. Students who have a special interest in the welfare of children can also participate in an elective Special Interest Group in Pediatrics, which meets regularly to discuss such topics as the ethical issues of reproductive choice and severe prematurity, human sexuality, teenage pregnancy, sexual abuse, divorce and adoption. These seminars are developed by the students with the help of a faculty advisor.

Fourth-year students can choose to participate in the Senior Scholars program, designed to provide in-depth clinical and/ or research experience in an area of special interest. Electives are also available in pediatric subspecialties, general pediatrics, pediatric emergency service and pediatric or neonatal intensive care.



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Psychiatry

The Department of Psychiatry features:

- an emphasis on psychiatric problems that frequently arise in primary care medicine;
- the use of an integrative model of psychiatry emphasizing the biologic, psychodynamic, and social and behavioral aspects of treatment; and
- a broad research base in neuroscience, psychopharmacology, psychosocial rehabilitation, mental health policy, psychiatric treatment, and adult and child psychiatric subspecialties.

The Department of Psychiatry provides educational programs throughout all four years of the UMass Medical School curriculum. Courses during the first three years encompass interviewing, diagnostic and etiologic issues as well as treatment and management modalities. Normal and abnormal development and psychological functioning are considered, and social, behavioral, biological and psychodynamic models are integrated throughout the curriculum.

During the third year, a Core Clinical Experience gives students an opportunity to further develop the interviewing, reasoning and communication skills that are fundamental to psychiatric diagnosis and intervention. An integrative model is stressed, emphasizing the biological, psychodynamic, social and behavioral aspects of treatment in both inpatient and outpatient settings.

The department offers a Senior Scholars Program and a number of fourth-year electives, including advanced clinical rotations on inpatient or consultation units as well as experience in specialized areas such as law and psychiatry, addiction psychiatry, child and adolescent psychiatry, child maltreatment, community psychiatry, psychiatry for the homeless, women's mental health and neuropsychiatry.



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Jonathan Ryan Coffman, MPH, CHES, CTTS-M

Deborah Ekstrom, MA, MPP

Virginia Merritt, BA Linda Smothers, MD Zayda Vallejo, MLITT

Clinical Instructor

David H. Levoy, MD

Research Instructor

Valerie F. Williams, MA, MS



Second-year students learn about international medical care on a personal level

Twenty-seven members of the School of Medicine's Class of 2015 traveled all over the world last summer to learn about international medical care on a very personal level. Some visited countries completely unfamiliar to them, while others returned home to countries they left as children. A few conducted research while others shadowed health care professionals or served in local health care clinics.

The second-year students presented posters detailing their global adventures in August. Also presenting posters were students in the Summer Service-Learning Assistantship Program, who conducted service learning projects domestically.

Some of those presenting international posters were participants in the Pathway on Serving Multicultural and Underserved Populations elective, a course designed to help students develop linguistic and

cultural competence and sensitivity to the hardships that many immigrants and poor people face. As part of the elective, they received a stipend to help with travel and living costs.

Jeremy Konstam said he had an "incredible experience" during his four weeks in Ecuador, where he lived with a local family, took language classes, volunteered to teach English at a local school and observed at a family health clinic. "It was interesting to see how health care is delivered in a low-resource setting," he said, noting he was impressed with the skill of the local doctors and the overall continuity of care.

Other students traveled to Argentina, El Salvador, Guatemala, India, Albania, Tanzania and China, among other countries.



SOM 13-15

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David M. Bear, MD
Richard M. Berlin, MD
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Rachid M. Och, MD
Richard A. Prager, PhD
Jonathan Stuart Rothman, MD*

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Quantitative Health Sciences

The Department of Quantitative Health Sciences offers research expertise, comprehensive training programs and services that focus on:

- Biostatistics
- Epidemiology
- · Health services research
- Health informatics
- Implementation science
- Health disparities
- Patient-reported outcomes measurement

Established in 2009, the Department of Quantitative Health Sciences (QHS) is enhancing the clinical and translational research enterprise at UMass Medical School. The department complements the recently established UMass Center for Clinical and Translational Science and is organized around four academic divisions: Biostatistics and Health Services Research; Epidemiology of Chronic Disease and Vulnerable Populations; Health Informatics and Implementation Science; and Outcomes Measurement Science.

By consolidating, linking and expanding resources for quantitative methods and study design at UMMS, QHS promotes team-based research programs across quantitative, clinical and basic-science disciplines. As a central strategy in the start up of this new department, QHS has recruited some 30 new junior and senior faculty to date. QHS academic faculty are independent investigators and also collaborative methodologists in joint projects with other investigators across campus.

QHS faculty lead and teach in programs such as the Master of Science in clinical investigation and the PhD in clinical and population health research (CPHR). QHS faculty also serve as advisers and mentors for trainees at all levels, from medical students through junior faculty.

QHS and the CPHR program are located in about 23,000 square feet of new space in the Albert Sherman Center in close proximity to the RNAi Therapeutics Institute and other research labs as well as to novel medical student training facilities. This proximity lends itself to the development of unique clinical and translational research partnerships.

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Instructor

Tze Chao Chiam, PhD Mayra Silvina Tisminetzky, MPH, MD, PhD*

Radiation Oncology

The Department of Radiation Oncology remains one of the largest clinical and academic departments in the eastern United States. The department manages eight clinical facilities with 12 linear accelerators, with the majority of facilities equipped with daily image guidance and four dimensional planning. Each campus is fully equipped for advanced technology therapy, including intensity modulation treatment and stereotactic radiosurgery and body radiotherapy. The department maintains a strong brachytherapy service in multiple disease sites. Each radiation oncologist maintains strong relationships with our disease based multi-disciplinary programs within the Cancer Center to ensure outstanding patient care and clinical service. The department campuses are at Holyoke Hospital, Harrington Hospital, Health Alliance-Fitchburg, University and Memorial campuses in Worcester, Marlboro Hospital (open 2013), Holy Family Hospital (Methuen-Steward) and St. Elizabeth Hospital (Brighton-Steward).

The department is the home to the Quality Assurance Review Center (QARC). QARC is the quality assurance vehicle for the National Cancer Institute (NCI) clinical trials program with emphasis in diagnostic radiology and radiation oncology. QARC houses data from clinical trials dating from 1970 and currently provides real time review of imaging and radiation therapy treatment objects for NCI and industry clinical trials. QARC writes all protocols for the cooperative group programs and interfaces daily with all of the NCI clinical cooperative groups for protocol case management and publications. The QARC campus is housed in Lincoln, RI. The department has an active clinical trials program with several internal IRB approved protocols evaluating process changes in radiation therapy.

The department is actively engaged in many educational activities both in the medical school and in allied health. Radiation oncology requires a dedicated group of therapy technologists and physics planning staff, and there are few educational and training programs. The department has a

therapy school with yearly graduates since 1989. The department manages the Cancer Concepts Course for the Medical School in collaboration with our colleagues in medical oncology and has sponsored many fifth year students in performing research supporting their applications to radiation oncology and other residency programs.

The department participates in many basic science and translational research activities in collaboration with several clinical and basic science colleagues at UMMS. We have demonstrated that cell adhesion modulation therapy through an anti-integrin mechanism promotes enhanced sensitivity to radiation therapy in disease sites not always amenable to chemotherapy and have identified a neuroendocrine phenotype of prostate cancer that is particularly resistant to radiation therapy. With our colleagues in pathology we have evaluated the role of immune modulation with repair of radiation injury, and with our colleagues in plastic surgery, we have demonstrated that optical imaging models can predict vascular changes from radiation therapy within 12 hours of treatment.

The department promotes active integration of outstanding clinical service with education and research objectives to move new ideas from the bench to daily patient care.

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Instructor

Mark J. Brenner, MD

Radiology

Faculty from the Department of Radiology interact with students throughout their four years at UMass Medical School. In the Foundations of Medicine curriculum, radiologists employ the full spectrum of diagnostic imaging studies in correlation with gross anatomic findings. In the Development, Structure and Function course, the comprehensive introductory radiology curriculum includes thoracic, abdominal, musculoskeletal, vascular and neurological imaging. All modalities (x-ray, CT, MRI, Pet-CT, ultrasound, angiography, mammography and nuclear medicine) are incorporated into the curriculum.

Month-long elective clerkship experiences in all areas of radiology are offered for fourth-year students from both UMass Medical School and for visiting students. Opportunities to observe the entire spectrum of imaging procedures, both diagnostic and interventional/ therapeutic, are provided. Additional monthlong advanced clerkships are available in vascular interventional radiology, neuroradiology and pediatric radiology, as are other individually tailored sub-specialty rotations including specialized research opportunities.

The Department of Radiology maintains core labs specializing in nuclear medical physics, molecular imaging probes and small animal imaging. Our Advanced MRI Center and the New England Stroke Research Center provide the foundation for several worldclass programs focused on the diagnosis and treatment of stroke. Our new breast CT serves as the focal point for the Program in Innovative Breast Imaging. The department maintains and fosters close, collaborative relationships with numerous other departments throughout the school. These interactions support innovative translational research in numerous areas of diagnostic imaging.

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Instructor
Xinrong Liu, PhD

Surgery

Along with the recruitment of exceptional faculty and the maintenance of its strong tradition in providing outstanding trauma services, the Department of Surgery continues its growth with:

- the development of a Cardiovascular Center of Excellence;
- a focus on enhancing minimally invasive techniques in all disciplines;
 and
- an increasing concentration in surgical oncology.

The Department of Surgery has a long history of dedication to the education and mentorship of medical students. It is the aim of the department to provide a broad-based body of knowledge and basic technical skills that are applicable to all areas of medicine, with additional opportunities for more specialized study based on individual student interest. These goals are accomplished in collaboration with several community hospitals throughout Massachusetts.

The third-year Core Clinical Experience in Surgery features general/vascular surgery, where students have an opportunity to become an active and integral member of the care team, including the day-to-day treatment of patients as well as regular participation in the operating room setting. This experience is complemented by attendance at surgical clinics and offices, where students are able to assist in providing outpatient care. The experience also provides exposure to a variety of surgical subspecialties, including thorough outpatient, inpatient and operating room experiences. Enhancement of learning opportunities occurs through student participation in regular conferences and lectures.

Fourth-year students are encouraged to enroll in a variety of month-long general surgery or subspecialty electives in order to obtain more advanced knowledge. Students may choose an individual preceptor or design a more formal subinternship.

Selected students who are interested

in pursuing a career in surgery may also choose to participate in a two-month Senior Scholars elective, accomplished under the guidance of a faculty preceptor and involving both clinical and research training.

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Clinical Instructor

Mark S. DiStefano, MD

Urology

The Department of Urology was created in July 2012. Prior to that time it was a division of the Department of Surgery. Since its inception, the department has concentrated on the recruitment of urologists with excellent clinical skills and a strong desire to teach in an academic environment.

In the last year, the Department of Urology has recruited several accomplished faculty who joined urologists who have been faculty members for many years. Together these urologists offer the full spectrum of urologic care including pediatric urology, GU oncology, female urology, infertility, incontinence, stone disease, treatment of various conditions of the prostate, minimally invasive surgery, both laparoscopic and robotic and urodynamic evaluation of various neurologic conditions.

The urology faculty now teaches residents and fellows from the departments of Family Medicine & Community Health, Obstetric & Gynecology, Internal Medicine, Pediatrics and Surgery. In addition, clerkships are now available for third- and fourth-year medical students. The faculty also participates in a variety of protocols for the treatment of urologic malignancies and they collaborate with UMass Medical School colleagues on clinical research projects. Finally, the department has re-established other scholarly pursuits in the form of monthly Urology Grand Rounds and visiting professorships. The long range plan is to re-establish a urology residency program.

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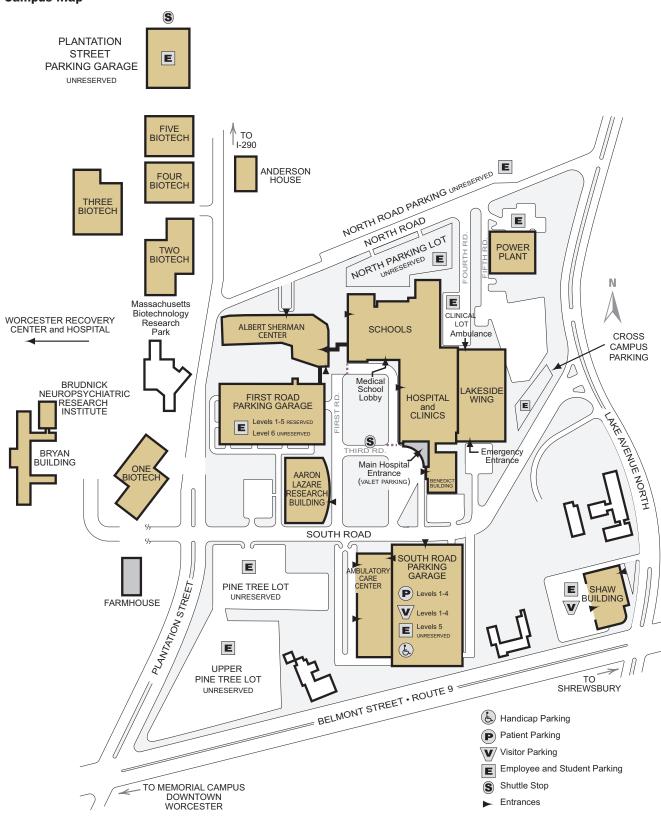
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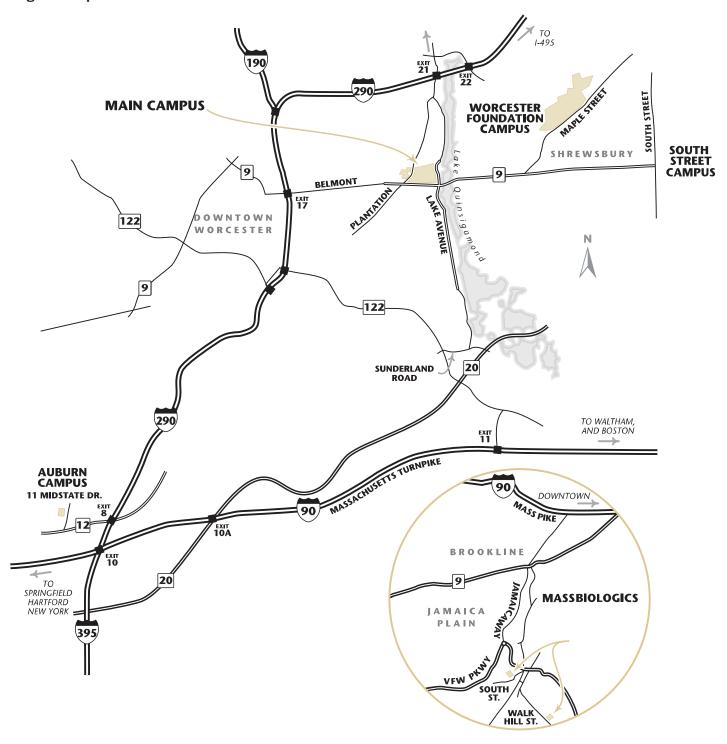
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University of Massachusetts Medical School Campus Map



University of Massachusetts Medical School Regional Map





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