EEOB 265. Advances in Population and Evolutionary Biology (1 or 2) Seminar, 1 hour; outside research, 0-3 hours. Prerequisite(s): graduate standing or consent of instructor. Presentations by visiting scholars, faculty, and students on current research topics in population and evolutionary biology. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

BIOL 281 (E-Z). Seminar in Cell Development, Structure, and Function (2) Seminar, 2 hours. Prerequisite(s): graduate standing; consent of instructor. Lectures, discussions, and demonstrations by students, faculty, and invited scholars on selected subjects concerned with the principles of cell development, structure, and function. E. Cell Biology; F. Molecular Biology; G. Developmental Biology. Segments are repeatable. Cross-listed with CMD 281 (E-Z).

EEOB 282. Seminar in Genetics and Evolution (2-4) Seminar, 2-4 hours. Prerequisite(s): graduate standing; consent of instructor. Presentations by students, faculty, and invited scholars on selected topics concerned with the principles of genetics and evolution. Course is repeatable.

EEOB 283. Seminar in Organismal Physiology and Physiological Ecology (2-4) Seminar, 2-4 hours. Prerequisite(s): graduate standing; consent of instructor. Presentations by students, faculty, and invited scholars on selected topics concerned with the principles of organismal physiology and physiological ecology. Course is repeatable.

BIOL 284. Seminar in Biology (2-4) Seminar, 2-4 hours. Prerequisite(s): graduate standing; consent of instructor. Consists of lectures, discussions, and demonstrations by students, faculty, and invited scholars on selected topics concerned with the principles of biology. Course is repeatable.

BIOL 289. Special Topics in Neuroscience (2) Seminar, 2 hours. Prerequisite(s): graduate standing or consent of instructor. An interdisciplinary seminar consisting of student presentations and discussion of selected topics in neuroscience. Content and instructor(s) vary each time course is offered. Students who present a seminar receive a letter grade; others receive a Satisfactory (S) or No Credit (NC) grade. Course is repeatable.

EEOB 290. Directed Studies (1-6) Individual study, 3-18 hours. Prerequisite(s): graduate standing; consent of instructor and graduate advisor. Individual studies on specially selected topics under the direction of a faculty member. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

EEOB 299. Research for the Thesis or Dissertation (1-12) Outside research, 3-36 hours. Prerequisite(s): graduate standing; consent of instructor. Original research in an area selected for the advanced degree. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

Professional Courses

BIOL 301. Teaching of Biology at the College Level (1) Seminar, 1 hour. Prerequisite(s): graduate standing. A program of weekly meetings and individual formative evaluations of new Biology Teaching Assistants. Covers instructional methods and classroom activities most suitable for teaching biology. Conducted by the TA Development Program. Graded Satisfactory (S) or No Credit (NC).

EEOB 400. Introduction to Graduate Study in Biology (2) Lecture, 1 hour; discussion, 1 hour. Prerequisite(s): graduate standing; consent of instructor. Introduces opportunities and requirements for successful graduate study. Emphasis is placed on effective strategies for developing and implementing a program of professional development and graduate research. Graded Satisfactory (S) or No Credit (NC).

Biomedical Sciences

Subject abbreviation: BMSC

Division of Biomedical Sciences

Craig V. Byus, Ph.D., Dean and Program Director
Leil Anne Schiller, Ph.D., Associate Dean
Ameae M. Walker, Ph.D., Chair of the Faculty
Stewart W. Shankel, M.D., Director of Clinical Instruction
Program Office, 1626 Statistics-Computer Bldg. (951) 827-4333 or 4334; bio-med.ucr.edu

Professors

Craig V. Byus, Ph.D. Pharmacology (Biomedical Sciences/Biochemistry) Salma Haider Endowed Chair in Biomedical Sciences
David A. Johnson, Ph.D. Pharmacology
David Lo, M.D., Ph.D. Genetics (Distinguished Professor)
Paul M. Quinton, Ph.D. Physiology
Neal A. Schiller, Ph.D. Microbiology/Immunology
John Y.-J. Shyy, Ph.D. Pharmacology/Physiology
Daniel S. Strauss, Ph.D. Human Genetics (Biomedical Sciences/Biology)
Ameae M. Walker, Ph.D. Microanatomy

Professors Emeriti

Mary Ann Baker, Ph.D. Neurosciences
Richard A. Luben, Ph.D. Endocrinology (Biomedical Sciences/Biochemistry)
Anthony W. Norman, Ph.D. Endocrinology (Biomedical Sciences/Biochemistry)
Michael B. Stemerman, M.D. Biomedical Sciences

Associate Professors

Monica J. Carson, Ph.D. Gliat Biology/Neuroimmunology
Inyra M. Ehill, Ph.D. Biology/Neuroimmunology
Emma Wilson, Ph.D. Parasite Immunologist
Christian Y. Lytle, Ph.D. Physiology

Assistant Professors

Kathryn DeFea, Ph.D. Cell Biology/Biochemistry
Douglas W. Ethell, Ph.D. Neurobiology

Lecturer

James Colgan, Ph.D.

Clinical Professors

Y. Paul Anyadi, M.D.
Roscoe D. Atkinson, M.D.
Ann F. Bolger, M.D.
Neal S. Bricker, M.D.
Lawrence A. Cone, M.D.
William P. Hunt, M.D.
Asma B. Jafri, M.D.
William E. Junkert, M.D.
Rajagopal Krishnan, M.D.
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C. Paul Sinkhorn, M.D.
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Constance M. Vaidheim, Ph.D.

Associate Clinical Professors

Savesh Chandik, M.D.
Walter P. F. Combs, M.D.
Alan C. Compton, M.D.
Vinod K. Dasika, M.D.
Samuel E. Dey, Jr., M.D.
James T. Evans, M.D.
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Laura A. Hammond, Ph.D.
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Jonathan W. Horstmann, M.D.
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Galen C. L. Huang, M.D.
Andrew M. Hubbard, M.D.
James S. Hwang, D.O.
Ramesh Karody, M.D.
Daniel Il-Sun Kim, M.D.
Sharon M. Laughlin, M.D.
Javier I. Machuca, M.D.
Pranav R. Mehta, M.D.
D. Steven Meyerling, M.D.
Kevin J. Mielke, D.O.
Mina N.S. Mikhail, M.D.
Vinod Mishra, M.D.
Renu Mittal, M.D.
James H. Mullen, M.D.
Jania F. Neuman, M.D.
Virgil J. Nielsen, M.D.
Kirk D. Pagel, M.D.
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Catherine Steel, Ph.D.
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Ravi Thiruvengadam, M.D.
Samuel G. Wiltchik, M.D.
Joanne T. Witkowski, M.D.

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Antonious Brandon, Ph.D.
H. Mark Carter, M.D.
Adam Chen, M.D.
Andrew P. Cerr, M.D.
Tien N. Dinh, M.D.

Assistant Clinical Professors

Christian Y. Lytle, Ph.D. Physiology

Special Topics in Neuroscience (2) Seminar, 2 hours. Prerequisite(s): graduate standing or consent of instructor. An interdisciplinary seminar consisting of student presentations and discussion of selected topics in neuroscience. Content and instructor(s) vary each time course is offered. Students who present a seminar receive a letter grade; others receive a Satisfactory (S) or No Credit (NC) grade. Course is repeatable.

Clinical Instruction

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Christian Y. Lytle, Ph.D. Physiology

UCR/UCLA Thomas Haider Program in Biomedical Sciences

The mission of the prestigious UCR/UCLA Thomas Haider Program in Biomedical Sciences is to train physicians for distinguished medical careers in service to the people of California, with an emphasis on the needs of the underserved, inland, and rural populations.

UCR provides a unique path of entrance to one of the country’s leading medical schools. Undergraduate students at UCR have exclusive access to 24 seats in medical school each year through the university’s joint program with the David Geffen School of Medicine at UCLA. UCR students admitted to the program complete years 1 and 2 of their medical education at UCR. They follow a state-of-the-art disease-based integrated curriculum taught by basic science research faculty who work closely with a special cadre of highly qualified, community-based, physician faculty. This curriculum focuses on developing the process of life-long learning, employs problem-based learning, and requires extensive computer use. Years 3 and 4 of medical school are completed at UCLA, after which students receive their M.D. degrees from UCLA.

Only undergraduates who entered UCR as freshmen or as transfer students may apply to the UCR/UCLA Program. Students must be enrolled at UCR for at least two years (six continuous full-time quarters) in the pursuit of a bachelor’s degree before entering the program. Only under truly exceptional circumstances will the program matriculate a student without a UCR baccalaureate degree.

Applicants apply through the American Medical College Application Service, at www.amcas.org, following its guidelines and deadlines. Students may submit their applications at any time during the application period, as early as June (14 months before medical school classes begin in August at UCR) or as late as November 1 (9 months before classes begin). Applications without recent MCAT scores are considered incomplete. Review the application guidelines at www.biomed.ucr.edu and the application process at www.amcas.org.

Unique aspects of the program include the following:

- Students from any major may apply for one of the 24 seats as long as they have completed the prerequisite course work and fulfilled other application requirements before entering the program.
- Students accepted into the UCR/UCLA Program complete their first two years of medical school on the UCR campus and then move to UCLA to complete their medical education and graduate with an M.D. from UCLA.

Prerequisite Courses

Students preparing to apply to the UCR/UCLA Program should excel in their undergraduate academic program and complete specific course work before admission to the UCR/UCLA Program. Students who plan to transfer to UCR from another college or university for their undergraduate studies and then apply to the UCR/UCLA Program should complete, where possible, courses that have been designated as being equivalent to UCR courses. Transfer students from community colleges are encouraged to view the UCR/UCLA Program as an attractive and viable avenue to medical school.

The UCR/UCLA Program prerequisite course curriculum is identical to the admissions requirements of the David Geffen School of Medicine at UCLA. Shown as UCR course work, it is as follows:

- **English** — one year of college English to include the study of English composition (ENGL 001A, ENGL 001B, ENGL 001C or equivalent)
- **Physics** — one year of college physics with laboratory (PHYS 002A, PHYS 02LA, PHYS 002B, PHYS 02LB, PHYS 002C, PHYS 02LC or equivalent)
- **Chemistry** — two years of college chemistry to include the study of inorganic chemistry and organic chemistry with laboratory (CHEM 001A, CHEM 001B, CHEM 001C, CHEM 011A, CHEM 011B, CHEM 011C, and CHEM 112A, CHEM 112B, CHEM 112C or equivalent)
- **Biology** — one year of general biology with laboratory (BIOL 005A, BIOL 05LA, BIOL 005B, BIOL 005C or equivalent)
- **Mathematics** — one year of college mathematics to include introductory calculus and statistics (MATH 009A, MATH 009B, STAT 100A or equivalent)

A one-quarter course in biochemical to cover structure, function, and metabolism of biological molecules (BCH 100 or BCH 110A, BCH 110B or equivalent), while not required for admission, is highly recommended. Courses in Spanish language and the humanities are also highly recommended.

AP results are not accepted as substitutes for the required science courses.

Related Literature and References

UCR currently has articulation agreements with most of the California community colleges. These agreements list specific community college courses that have been designated as comparable to UCR courses. See the statewide articulation Web site, at www.assist.org, or California community college Web sites.

Academic Advising

UCR undergraduates receive academic advising from professional staff and faculty of the department or program of their chosen major.

Admission

Students from any UCR major are eligible to apply for one of the 24 seats in the medical school each year. The admission requirements for the UCR/UCLA Program are identical to those for UCLA’s Geffen School of Medicine, but UCR students have a distinct advantage when applying to the UCR/UCLA Program. They compete only with other UCR students for those 24 seats in the program and the opportunity to earn an M.D. degree from UCLA’s Geffen School of Medicine.

Admission considerations

A strong candidate for admission to the UCR/UCLA Program has:

- Completed the UCR/UCLA Program prerequisite course curriculum
- An excellent undergraduate academic record
- An excellent score on the Medical College Admission Test (MCAT)

The strong candidate also shows a commitment to a career in medicine as demonstrated by volunteerism in medicine, clinical experience, or research.

A solid record of community service is highly desired. It is important that applicants have made a difference to those around them. Examples of community service pursuits include volunteer work, leadership in campus organizations, mentor service for a peer or youth group, and commitment to and participation in religious or service organizations.

Letters of Reference

Applicants must submit letters from individuals such as professors and those who can speak about the applicant’s educational talents, character, work ethic, motivation, special traits, and positive influence on others.

Admission Interview

Qualified applicants will be invited to interview and have the opportunity to talk about themselves, their special qualities, and demonstrate their ability to interact with others.

A Four-Year Medical Program

Years 1 and 2

Students admitted to the UCR/UCLA Program are jointly enrolled at UCR and UCLA’s Geffen School of Medicine and take their first two years of medical school at UCR. Unlike other medical schools where students are taught in classes of 100 or more, the classes in the UCR/UCLA Program are small and comprised of 24 students during each of the first two years. This allows students to get to know their professors and receive the individual help and guidance they need to suc-
2. Courses taken during the first year of medical school (59 units)
   BMSC 231, BMSC 231M, BMSC 232, BMSC 232M, BMSC 233, BMSC 233M, 
   BMSC 234, BMSC 234M, BMSC 235, BMSC 235M

Lower-Division Courses

BMSC 091. Freshman Advising Seminar for Medical Scholars Program Students (1 Seminar, 1 hour. 
Prerequisite(s): freshman standing in the Medical Scholars Program. Introduction to UCR for students in 
the Medical Scholars Program. Focuses on learning 
the necessary survival skills to succeed in college and 
prepare for a career in the allied health sciences. 
Graded Satisfactory (S) or No Credit (NC). 

BMSC 092. First-Year Seminar for Medical Scholars Program Students: Topics in Health Careers (1) 
Seminar, 1 hour. Prerequisite(s): freshman standing in 
the Medical Scholars Program or consent of instructor. 
A discussion of health careers in biomedical sciences and 
allied health sciences for students in the Medical 
Scholars Program. Graded Satisfactory (S) or No 
Credit (NC).

BMSC 093. Seminar for Medical Scholars Program Students (1 Seminar, 1 hour. Prerequisite(s): 
lower-division standing in the Medical Scholars Program or consent of instructor. 
A discussion of special topics in biomedical sciences and allied health sciences as 
they pertain to students in the Medical Scholars Program. Graded Satisfactory (S) or No Credit (NC). 
Schiller

BMSC 094. Independent Reading (1-2) Consultation, 1- 
2 hours. Prerequisite(s): consent of instructor. 
Independent study under faculty supervision. Possible 
topics include modern approaches to the pathophys-
ology of disease, delivery of medical care to the com-
munity, or current medical education. Graded 
Satisfactory (S) or No Credit (NC). Course is 
repeatable to a maximum of 4 units.

BMSC 097. Research Tutorial in Biomedical 
Sciences (1-2) Laboratory, 3-6 hours. Prerequisite(s): 
grade point of 3.0 and consent of instructor. 
Laboratory tutorial in research related to biomedical 
sciences. To provide laboratory experience in the 
areas of physiology, microbiology, molecular biology, 
pharmacology, cell biology, immunology, biochemistry 
for exceptional lower-division students. A written 
report is required at the end of each quarter. Graded 
Satisfactory (S) or No Credit (NC). May be repeated 
for up to 6 units.

Upper-Division Courses

BMSC 191. Seminar in Biomedical Sciences (2) 
Seminar, 20 hours per quarter. Prerequisite(s): upper-
division standing in the Medical Scholars Program or 
consent of instructor. Special topics in biomedical sci-
cences, healthcare delivery, cultural competency, bi-
omedical research, and related areas. Course is repeat-
able to a maximum of 6 units.

BMSC 194. Independent Reading (1-2) Discussion, 1 
hour; outside research, 2-3 hours. Prerequisite(s): 
upper-division standing and consent of instructor and 
Divisional Dean. Independent study involving library 
projects on topics related to Biomedical Sciences. 
Independent study will be conducted under faculty 
supervision. A written report to be graded Satisfactory 
(S) or No Credit (NC) will be requested. Course is 
repeatable to a maximum of 4 units.

BMSC 197L. Research for Undergraduates (1-3) 
Laboratory, 3-9 hours. Prerequisite(s): upper-division 
standing (completion of 90 quarter units) and consent of 
instructor. An introduction to the methods of 
research in biomedical sciences. The student will con-
duct investigation in an area of biomedical sciences 
under the supervision of a Division of Biomedical 
Sciences faculty member and submit a written report 
on his/her work. Course is repeatable.

Graduate Courses

BMSC 202. Molecular Basis of Disease (3) S 
Lecture, 2 hours; discussion, 1 hour. Prerequisite(s): graduate 
standing or consent of instructor. Discussion of the 
molecular basis of disease with special emphasis on 
new developments and the broad application of 
approaches and techniques. Course is repeatable with 
consent of the student's advisory committee; may be 
applied only once toward core requirements.

BMSC 222 (E-Z). Special Topics in Biomedical 
Sciences (2) Lecture, 1 hour; discussion, 1 hour. 
Prerequisite(s): graduate standing or consent of 
instructor. For BMSC 222V, BIOL 128/CHNS 128 or 
consent of instructor. Oral presentations and intensive 
small-group discussion of selected topics in the area 
of special competence of each faculty member. 
Course emphasizes recent advances in the special 
topic area and varies accordingly. E. Basic 
Epitheliology. Lytle. Q. Regulation of Gene 
Expression. Strauss. J. Microbial Pathogenesis and 
Host-Pathogen Interactions. Schiller. L. Current Topics 
Luben. N. Mechanisms of Steroid Hormones. 
Norman. O. Steroid Metabolism. Henry. P. Molecular 
Pharmacology. Johnson. Q. Mechanisms of 
V. Advanced Immunology. X. Mutagenics and 
Segments are repeatable. Byus in charge

BMSC 223 (E-Z). Themes in Human Biology and 
Disease (2-4) For hours and prerequisites, see 
seg-
dment descriptions. Graduate students write a paper on 
current basic research relevant to the course theme.

BMSC 223E. Inflammation, Autoimmunity, and Pathogen 
Defense (3) Lecture, 23 hours per quarter; discussion, 
8 hours per quarter; laboratory, 8 hours per quarter. 
Prerequisite(s): consent of course coordinator. 
Integrative view of the human immune system and 
inflammation in health and disease. Credit is awarded 
for only one of BMSC 223E, BMSC 229, or BMSC 
231. Carson

BMSC 223F. Cardiovascular Physiology (4) Lecture, 
30.5 hours per quarter; discussion, 11.5 hours per 
quarter; laboratory, 5 hours per quarter. 
Prerequisite(s): consent of course coordinator. 
Integrative view of the human cardiovascular system in 
health and disease. Credit is awarded for only one of 
BMSC 223F or BMSC 232. Lytle

BMSC 223G. Renal Physiology (3) Lecture, 22 hours 
per quarter; discussion, 8 hours per quarter; laborato-
ry, 2 hours per quarter. Prerequisite(s): consent of 
course coordinator. Integrative view of human kidney 
function and dysfunction. Credit is awarded for only 
one of BMSC 223G or BMSC 232. Quinton

BMSC 223J. Respiratory Physiology (3) Lecture, 25 
hours per quarter; discussion, 8 hours per quarter; 
laboratory, 6.5 hours per quarter. Prerequisite(s): con-
sent of course coordinator. Integrative view of the 
human respiratory system in health and disease. 
Credit is awarded for only one of BMSC 223J or BMSC 
232. Quinton
BMSC 223. Gastrointestinal Physiology (3) Lecture, 33 hours per quarter; laboratory, 6 hours per quarter. Prerequisite(s): consent of course coordinator. Integrative view of the human gastrointestinal system in health and disease. Credit is awarded for only one of BMSC 223J or BMSC 233. Lytle

BMSC 229. Foundations in Translational Research (8) Summer Lecture, 67 hours per quarter; discussion, 7 hours per quarter; laboratory, 18 hours per quarter. Prerequisite(s): first-year standing in the Biomedical Sciences graduate program or consent of graduate advisor. Covers basic principles of disease processes, genetics, and molecular, cellular, and developmental biology. Case-driven instruction accomplished through lectures, small group discussions, and laboratories. Offered in summer only. Credit is awarded for only one of BMSC 223E, BMSC 229, or BMSC 231. DeFea, Strauss

BMSC 231. Foundations of Medicine I (7.5) Lecture, 65.5 hours per quarter; discussion, 6 hours per quarter; laboratory, 20.5 hours per quarter. Prerequisite(s): first-year standing in medical school or consent of instructor. Covers basic principles of disease processes, genetics, and molecular, cellular, and developmental biology. Instruction is driven by cases and accomplished through lectures and discovery in small group discussions, laboratories, and conferences. Students using this course to fulfill requirements for the B.S. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Credit is awarded for only one of BMSC 223E, BMSC 229, or BMSC 231. DeFea, Strauss

BMSC 231M. Foundations of Medicine I: Clinical Aspects (3) Lecture, 2 hours per quarter; discussion, 24 hours per quarter; clinic, 15 hours per quarter. Prerequisite(s): first-year standing in medical school or consent of course coordinator; concurrent enrollment in BMSC 231. Covers aspects of anatomy, doctoring, and patient examination. Includes problembased learning that supports the material covered in BMSC 231. Students using this course to fulfill requirements for the B.S. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. DeFea, Strauss

BMSC 232. Cardiovascular, Renal, and Respiratory Sciences I (12) Discussion, 9 hours per quarter; laboratory, 19 hours per quarter; lecture, 107 hours per quarter. Prerequisite(s): first-year standing in medical school or the graduate program in Biomedical Sciences or consent of instructor; BMSC 232; BMSC 232M; concurrent enrollment in BMSC 232. Covers aspects of anatomy, doctoring, and patient examination. Includes problembased learning that supports the material covered in BMSC 232. Students using this course to fulfill requirements for the B.S. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Luben, Shyy

BMSC 233. Musculoskeletal Medicine (4) Lecture, 36 hours per quarter; discussion, 2 hours per quarter; laboratory, 7 hours per quarter. Prerequisite(s): first-year standing in medical school or the graduate program in Biomedical Sciences or consent of instructor; BMSC 233. Covers the musculoskeletal system, biology and pathology of the peripheral nervous system, and physical diagnosis. Utilizes lectures and case studies to accomplish course objectives. Promotes discovery of learning by small group discussions, laboratories, and conferences. Students using this course to fulfill requirements for the B.S. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Luben, Shyy

BMSC 234. Cardiovascular, Renal, and Respiratory Sciences II (12) Lecture, 62 hours per quarter; discussion, 8 hours per quarter; laboratory, 30 hours per quarter; clinic, 18 hours per quarter. Prerequisite(s): BMSC 232; BMSC 232M; concurrent enrollment in BMSC 232. Covers aspects of anatomy, doctoring, and patient examination. Includes problembased learning that supports the material covered in BMSC 234. Students using this course to fulfill requirements for the B.S. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Baker, Colgan

BMSC 234M. Musculoskeletal Medicine: Clinical Aspects (4) Lecture, 14 hours per quarter; discussion, 10 hours per quarter; laboratory, 30 hours per quarter; clinic, 18 hours per quarter. Prerequisite(s): BMSC 233; BMSC 233M; concurrent enrollment in BMSC 234. Covers aspects of anatomy, doctoring, and patient examination. Includes problembased learning that supports the material covered in BMSC 234. Students using this course to fulfill requirements for the B.S. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Johnson

BMSC 235. Clinical Neurosciences I (5) Lecture, 42 hours per quarter; discussion, 8 hours per quarter; laboratory, 6 hours per quarter. Prerequisite(s): BMSC 234. Covers neuroanatomy, neurophysiology, and the neuropathology, neuropsychiatry, and neuropharmacology that is coordinated with physical and psychological clinical skills development. Involves weekly cases and is presented through lectures, laboratory, small group discussions, conferences, and clinical visits. Graded Satisfactory (S) or No Credit (NC). Johnson

BMSC 236. Foundations of Medicine II (10) Lecture, 93 hours per quarter; discussion, 8 hours per quarter; laboratory, 10 hours per quarter. Prerequisite(s): secondyear standing in medical school or the graduate program in Biomedical Sciences or consent of instructor; BMSC 235. Covers the pathophysiology, pharmacology, physical diagnosis and treatment of infectious diseases, clinical hematology and oncology, and epidemiology and clinical reasoning skills. Involves weekly cases and is presented through lectures and discovery in small group discussions, laboratories, and conferences. Students using this course to fulfill requirements for the Ph.D. degree in Biomedical Sciences receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Annegret, Ethell

BMSC 236M. Foundations of Medicine II: Clinical Aspects (4) Discussion, 28 hours per quarter; clinic, 42 hours per quarter. Prerequisite(s): BMSC 235; BMSC 235M; concurrent enrollment in BMSC 236. Covers aspects of anatomy, doctoring, and patient examination. Includes problembased learning that supports the material covered in BMSC 236. Graded Satisfactory (S) or No Credit (NC). Schiller

BMSC 237. Gastrointestinal, Endocrine, and Reproductive Health I (13) Lecture, 80 hours per quarter; clinic, 42 hours per quarter; discussion, 34 hours per quarter; laboratory, 18 hours per quarter. Prerequisite(s): second-year standing in medical school; BMSC 236. Advanced clinical perspective of anatomy, biochemistry, pathophysiology, physical diagnosis, and imaging associated with gastrointestinal, endocrine, and reproductive health. Instruction involves weekly cases and is presented through lectures (usually two hours/day) and discovery in small group discussions, laboratories, clinical skills development, and conferences. Graded Satisfactory (S) or No Credit (NC). Carson, Walker

BMSC 238. Cardiovascular, Renal, and Respiratory Sciences II (12) Lecture, 62 hours per quarter; discussion, 22 hours per quarter; laboratory, 6 hours per quarter; clinic, 24 hours per quarter. Prerequisite(s): BMSC 237. Covers advanced clinical perspective of neurology, neuropathology, psychiatry, and neuropsychology that is coordinated with physical and psychological clinical skills development. Involves weekly cases and is presented through lectures, laboratory, small group discussions, conferences, and clinical visits. Graded Satisfactory (S) or No Credit (NC). Johnson

BMSC 239. Cardiovascular, Renal, and Respiratory Sciences III (12) Lecture, 62 hours per quarter; discussion, 33 hours per quarter; laboratory, 44 hours per quarter. Prerequisite(s): second-year standing in medical school; BMSC 238. Advanced clinical perspective of anatomy, physiology, pathophysiology, physical diagnosis, and imaging in the cardiovascular, renal, and respiratory sciences. Instruction involves weekly cases and is presented
BMSC 240. Integrative Human Biology and Disease (3)
Discussion, 30 hours per quarter. Prerequisite(s): second-year standing in medical school; BMSC 239. Reviews concepts of human biology and disease covered in BMSC 231, BMSC 231M, BMSC 232, BMSC 232M, BMSC 233, BMSC 233M, BMSC 234, BMSC 234M, BMSC 235, BMSC 235M, BMSC 236, BMSC 236M, BMSC 237, BMSC 238, and BMSC 239. Graded Satisfactory (S) or No Credit (NC). Shankel

BMSC 251. Colloquium in Biomedical Sciences (1)
Colloquium, 1 hour. Prerequisite(s): graduate standing in Biomedical Sciences or consent of instructor. Specialized discussions by staff and students of current research topics in biomedical sciences. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

BMSC 252. General Seminar in Biomedical Sciences (1) Seminar, 1 hour. Prerequisite(s): graduate standing. Oral presentations by staff and visiting scholars on current research topics in the field of biomedical sciences. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

BMSC 254. Graduate Seminar in Biomedical Sciences (1) Seminar, 1 hour. Prerequisite(s): graduate standing. Oral reports by graduate students on current research topics in biomedical sciences. Students who present a seminar receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Course is repeatable.

BMSC 260A. Topics in Translational Biomedical Research (2) F Lecture, 2 hours per quarter; discussion, 18 hours per quarter. Prerequisite(s): consent of instructor or graduate advisor; concurrent enrollment in BMSC 232. A survey of the mechanisms of common human diseases at the molecular, cellular and organ system levels and the multidisciplinary approaches used for their investigation. Instructional components include lectures, discovery in problem-based learning sessions, and independent study. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor. Byus, Lytle

BMSC 260B. Topics in Translational Biomedical Research (2) Lecture, 2 hours per quarter; discussion, 18 hours per quarter. Prerequisite(s): consent of instructor or graduate advisor; concurrent enrollment in BMSC 233. A survey of the mechanisms of common human diseases at the molecular, cellular and organ system levels and the multidisciplinary approaches used for their investigation. Instructional components include lectures, discovery in problem-based learning sessions, and independent study. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor. Shyy, Schiller

BMSC 260C. Topics in Translational Biomedical Research (2) Lecture, 2 hours per quarter; discussion, 18 hours per quarter. Prerequisite(s): consent of instructor or graduate advisor; concurrent enrollment in BMSC 234 and BMSC 235. A survey of the mechanisms of common human diseases at the molecular, cellular and organ system levels and the multidisciplinary approaches used for their investigation. Instructional components include lectures, discovery in problem-based learning sessions, and independent study. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor. Lo, Carson

BMSC 261. Methods in Biomedical Research (1)
Tutorial, 3 hours. Prerequisite(s): graduate standing in Biomedical Sciences or consent of instructor. Experimental studies on a specific laboratory technique involved in the study of human disease. Graded Satisfactory (S) or No Credit (NC). Course is repeatable to a maximum of 3 units. Carson

BMSC 290. Directed Studies (1-6) Outside research, 3-18 hours. Prerequisite(s): graduate standing in Biomedical Sciences or consent of instructor. Experimental or literature studies on specifically selected topics under direction of a staff member. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

BMSC 297. Directed Research (1-6) Outside research, 3-18 hours. Prerequisite(s): graduate standing in Biomedical Sciences or consent of instructor. Directed research in biomedical sciences performed prior to advancement to candidacy in preparation for dissertation projects. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

BMSC 299. Research for Dissertation (1-12) Outside research, 3-36 hours. Prerequisite(s): graduate standing in Biomedical Sciences or consent of instructor. Original research in the area selected for the advanced degree. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

BMSC 302. Directed Teaching (2) Practicum, 6 hours. Prerequisite(s): graduate standing in Biomedical Sciences. Supervised teaching in medical school courses. Required for all Biomedical Sciences graduate students. Fulfills the teaching portion of the teaching requirement for the Ph.D.; four units are required for the Ph.D. Graded Satisfactory (S) or No Credit (NC). Course is repeatable to a maximum of 6 units.

BMSC Division of Biomedical Sciences

Subject abbreviation: BMSC

Biomedical Sciences Graduate Program

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Xuan Liu, M.D., M.D. (Biochemistry)
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Khaled Razak, Ph.D. (Psychology)
Wendy Saltzman, Ph.D. (Biology)
Noboru Sato, Ph.D. (Cell Biology and Neuroscience)
Emma Wilson, Ph.D. (Biomedical Sciences)
Laura Zanello, Ph.D. (Biochemistry)

Graduate Program

The multidisciplinary interdepartmental graduate program in Biomedical Sciences offers graduate instruction leading to a Ph.D. degree or a combined M.D.–Ph.D. degree.

The aim of the graduate program is to provide students with training that crosses traditional boundaries between scientific disciplines and allows them to address modern biomedical research questions. The objective is to train scientists who have a broad knowledge of basic medical sciences, a high degree of expertise in an area of specialization, and effective teaching skills for a medical school or university environment.

The need for scientists who understand the interrelationships of various areas of medical science is readily apparent. For example, it is clearly advantageous for a scientist studying diabetes to understand the disease in depth. This requires a fundamental understanding of endocrinology (hormone secretion and action), cell biology (cell types that produce insulin and upon which insulin acts), biochemistry (insulin-receptor interactions, biochemical pathways regulated by insulin), genetics (hereditary factors in the development of diabetes), immunology (autoimmune mechanisms in diabetes), and Neuroscience. For example, it is apparent that diabetes is regulated by insulin, genetics (hereditary factors in the development of diabetes), biochemistry (insulin-receptor interactions, biochemical pathways regulated by insulin), genetics (hereditary factors in the development of diabetes), immunology (autoimmune mechanisms in diabetes), and Neuroscience. For example, it is apparent that diabetes is regulated by insulin, genetics (hereditary factors in the development of diabetes), biochemistry (insulin-receptor interactions, biochemical pathways regulated by insulin), genetics (hereditary factors in the development of diabetes), immunology (autoimmune mechanisms in diabetes), and Neuroscience. For example, it is apparent that diabetes is regulated by insulin, genetics (hereditary factors in the development of diabetes), biochemistry (insulin-receptor interactions, biochemical pathways regulated by insulin), genetics (hereditary factors in the development of diabetes), immunology (autoimmune mechanisms in diabetes), and Neuroscience. For example, it is apparent that diabetes is regulated by insulin, genetics (hereditary factors in the development of diabetes), biochemistry (insulin-receptor interactions, biochemical pathways regulated by insulin), genetics (hereditary factors in the development of diabetes), immunology (autoimmune mechanisms in diabetes), and Neuroscience. For example, it is apparent that diabetes is regulated by insulin, genetics (hereditary factors in the development of diabetes), biochemistry (insulin-receptor interactions, biochemical pathways regulated by insulin), genetics (hereditary factors in the development of diabetes), immunology (autoimmune mechanisms in diabetes), and Neuroscience.