PHYSIOLOGY

Office: 5374 Scott Hall; 313-577-1520
Chairperson: Joseph C. Dunbar
https://physiology.med.wayne.edu/

Physiologists study the functions of living organisms, tissues and/or isolated cells. The emphasis in physiology is on the functional interrelationships between healthy, as opposed to diseased tissues, cells and sub-cellular components. Increasingly, the discipline focuses on the properties of single cells and their sub-cellular components with the availability and application of molecular biology techniques. However, whether at the level of the single cell or the whole organism, the aim of the physiologist is to understand complex functional interrelationships between body tissues.

The Department of Physiology offers programs leading to the Master of Science and Doctor of Philosophy degrees. The degree of Master of Science is frequently the first step toward a Ph.D. Students planning a career in teaching or research in physiology are advised to complete the requirements for the Doctor of Philosophy degree. A Reproductive Sciences Concentration is an option in the Doctor of Philosophy program. It incorporates the teaching, research and physical resources of both the Physiology and the Obstetrics and Gynecology Departments, offering interdisciplinary doctoral training in the reproductive sciences with the degree earned through the Department of Physiology.

ANGOA-PEREZ, MARIANA: Ph.D., National Autonomous University of Mexico; Assistant Professor

CALA, STEVEN E.: Ph.D., Indiana School of Medicine; M.A., Texas A & M University; B.S., Purdue University; Associate Professor Emeritus

CHEN, XUEQUN: Ph.D., University of Michigan; M.S., B.S., Nankai University; Associate Professor

CHUNG, CHARLES S.: Ph.D., B.S., Washington University; Associate Professor

DEGRACIA, DONALD J.: Ph.D., Wayne State University; B.S., Michigan Technological University; Professor

DUNBAR, JOSEPH C.: Ph.D., Wayne State University; M.S., Texas Southern University; B.S., Alcorn College; Professor and William T. Traitel Endowed Chair

HONG, FELIX T.: Ph.D., Rockefeller University; M.D., National Taiwan University School of Medicine; Professor Emeritus

JENA, BHANU P.: Ph.D., Iowa State University; B.S., Utkal University; University Professor

JIN, JIAN-PING: M.D., M.Sc., Fourth Military Medical University; Ph.D., University of Iowa; Professor Emeritus

LAWSON, DAVID M.: Ph.D., Cornell University; M.S. and B.S., Virginia Polytechnic Institution; Professor Emeritus

MANNOZZI, JOSEPH: Ph.D., Wayne State University; Assistant Professor (Research)

MATEIKA, JASON H.: Ph.D., M.S., University of Toronto; B.S. University of Guelph; Professor

MUELLER, PATRICK: Ph.D., St. Louis University; Associate Professor

O'LEARY, DONAL S.: Ph.D., University of Texas; B.A., Miami University; Professor

PRZYKLENK, KARIN: Ph.D., University of Western Ontario; B.S., University of Saskatchewan; Professor

RAM, JEFFREY L.: Ph.D., California Institute of Technology; B.A., University of Pennsylvania; Professor

RAMADOSS, JAYANTH: Ph.D., Texas A&M University; Professor

RILLEMA, JAMES A.: Ph.D., M.S., Michigan State University; B.S., Calvin College; Professor Emeritus

ROSSI, NOREEN F.: M.D., Yale University School of Medicine; B.S., University of Detroit; Professor

SHISHEVA, ASSIA C.: Ph.D., B.S., Sofia University; Professor Emeritus

WALZ, DANIEL A.: Ph.D., Wayne State University; M.S., St. Louis University; B.S., St. John Fisher College; Professor

WESSELLS, ROBERT J.: Ph.D., The Ohio State University; B.S., Miami University; Associate Professor

YINGST, DOUGLAS ROY: Ph.D., University of Southern California, Los Angeles; B.A., McPherson College; Associate Professor Emeritus

ZHANG, ZHIBING: M.D., Ph.D., Tongji Medical School, Huazhong University of Science & Technology; Associate Professor

- Physiology (M.S.) (https://bulletins.wayne.edu/graduate/school-medicine/programs/physiology/physiology-ms/)
- Physiology (Ph.D.) (https://bulletins.wayne.edu/graduate/school-medicine/programs/physiology/physiology-phd/)
- Premedical Studies (Graduate Certificate) (https://bulletins.wayne.edu/graduate/school-medicine/programs/physiology/premedical-studies-graduate-certificate/)

PSL 5010 Individual Research I Cr. 2-5
Direct participation in laboratory research in the physiological sciences under the supervision of a departmental faculty advisor. Introduction to experimental protocol and current related scientific literature. Offered Every Term.
Restriction(s): Enrollment limited to students with a class of Junior or Senior.
Repeatable for 5 Credits

PSL 5200 Embryology: Premedical Studies Cr. 2
Students will learn the sequence of development of the human body from fertilization through the formation of the three-dimensional embryo, the contribution of various germ layers and precursors to definitive structures, including the role of cell interactions, induction, growth, and differentiation, and describe the origin of commonly occurring malformations in terms of abnormal developmental processes. Offered Yearly.
Restriction(s): Enrollment is limited to students with a major in Premedical Studies; enrollment is limited to Graduate level students.

PSL 5250 Biochemistry: Premedical Studies Cr. 2
This course is a comprehensive exploration of biochemistry, delving into protein and lipid structure, intermediary metabolism, individual metabolic pathways for carbohydrates and lipids, and the transmission of genetic information. Offered Yearly.
Restriction(s): Enrollment is limited to students with a major in Premedical Studies; enrollment is limited to Graduate level students.

PSL 5300 Physiology: Premedical Studies Cr. 2
This course teaches basic concepts in physiology to prepare the student to successfully complete first-year MD program physiology topics. The course is also designed to teach effective learning methods. Specific topics covered are: cell physiology, electrophysiology, vascular physiology, cardiac physiology, pulmonary physiology, and renal physiology. Offered Yearly.
Restriction(s): Enrollment is limited to students with a major in Premedical Studies; enrollment is limited to Graduate level students.

PSL 5400 Histology: Premedical Studies Cr. 2
Students will demonstrate the ability to identify the cells, tissues, and organs of the human body at the light microscopic level, identify significant fine structural features of cells or tissues as viewed with transmission electron microscopy, scanning electron microscopy, freeze-fracture electron microscopy, immunocytochemistry, or other selected research techniques, and to correlate the specialized or unique histological structural features at the light and electron microscopic levels with their normal function in the human body. Offered Yearly.
Restriction(s): Enrollment is limited to students with a major in Premedical Studies; enrollment is limited to Graduate level students.

PSL 5450 Gross Anatomy: Premedical Studies Cr. 2
Gross Anatomy is designed to assist students in acquiring knowledge of the human musculoskeletal system at a pace and depth similar to the first year of medical school. Students will learn the structural contents and anatomical relationships of the back & shoulder, arm, forearm, hand, gluteal region, thigh, leg, ankle, and foot. For each upper and lower extremity region, students are expected to learn how anatomical structures relate to function and how knowledge of normal anatomy can be applied to solve clinically relevant problems affecting the musculoskeletal system. Offered Yearly.
Restriction(s): Enrollment is limited to students with a major in Premedical Studies; enrollment is limited to Graduate level students.

PSL 5680 Basic Endocrinology Cr. 3
Basic description of the human endocrine system, the endocrine control of several physiologic processes (growth, development, metabolism and reproduction), and a description of common endocrine disorders. Offered Fall.
Prerequisites: BIO 3200 with a minimum grade of C- or BIO 4120 with a minimum grade of C-
Equivalent: BIO 5680

PSL 6010 Advanced Exercise Physiology Cr. 3
Metabolic, neuromuscular, cardiovascular, and respiratory adjustments to acute and chronic exercise in health and disease, including body composition and weight control, nutritional considerations, and the effects of different environments on exercise performance. Offered Fall.

PSL 6300 Biotechnology: Techniques and Applications Cr. 2
Various biotechnical methodologies currently used in research and industry; application of these methodologies in scientific inquiries. Offered Fall.

PSL 6310 Biotechnology: Techniques and Applications Lab Cr. 2-5
Students choose one of the biotechnology techniques discussed in PSL 6300 and spend the semester in an active research laboratory learning the practice of the technique through hands-on experience. Offered Winter.
Prerequisites: PSL 6300 with a minimum grade of C (may be taken concurrently)
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7010 Basic Graduate Physiology Lecture I Cr. 4
Introduction to basic human physiology. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7011 Basic Integrative Graduate Physiology I Cr. 4
Offered Fall.
Restriction(s): Enrollment is limited to students with a major in Physiology.

PSL 7015 Introduction to Metabolism Cr. 2
An introduction to intermediary metabolism of carbohydrate, lipids, amino acids and proteins. Focuses on the metabolic pathways involved in the synthesis and degradation of metabolites. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: BMB 7015

PSL 7020 Introduction to Rigor, Reproducibility, Experimentation, and Statistics in Physiology Cr. 3
Introductory to techniques use in research to develop experimental design, analyze and present data collected. Offered Winter.
Restriction(s): Enrollment is limited to students with a major in Physiology.
Fees: $50

PSL 7030 Basic Graduate Physiology Lecture II Cr. 4
Functional mechanisms of the human body. Offered Winter.
Prerequisite: PSL 7010 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7031 Basic Integrative Graduate Physiology II Cr. 4
Second of two courses designed to give an introduction to basic human functional physiology. Offered Winter.
Prerequisite: PSL 7011 with a minimum grade of C
Restriction(s): Enrollment is limited to students with a major in Physiology.

PSL 7040 Basic Graduate Physiology Laboratory II Cr. 2
Experimental physiology of organ systems. Offered Winter.
Restriction(s): Enrollment is limited to students with a major in Physiology.
Fees: $50

PSL 7060 Current Literature in Physiology Cr. 1
Students are required to present published papers at least once each semester, and must attend all class meetings. Offered Fall, Winter.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 4 Credits

PSL 7120 Cardiovascular Systems Modeling Cr. 3
Application of engineering principals and mathematical and computational techniques to cardiovascular systems. Partial differential equations, signal transduction pathway and biotransport modeling, and introduction to systems biology approaches. Offered Winter.
Prerequisites: BME 5010 with a minimum grade of B- or BME 5020 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: BME 7020

PSL 7180 Nutritional Metabolomics and Bioinformatics Cr. 3
Introduction to and application of the ""omics"" technologies to nutrition: genomics, proteomics, and metabolomics. Examples and exercises using bioinformatic software for multivariate data analyses. Offered Winter.
Prerequisite: NFS 6000 with a minimum grade of C- and STA 1020 with a minimum grade of C-
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: NFS 7000

PSL 7215 Nanobioscience Cr. 3
Introduction to interdisciplinary research field of nanobioscience, at the interphase of biology, chemistry, and physics; specific properties of nanoscale objects. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7220 Metabolism and Disease Cr. 2
This course will review normal metabolic pathways and their regulation and then discuss in depth aberrant metabolism as it contributes to or causes diseases such as diabetes, cancer, and neurodegeneration. Didactic lectures will be complemented with student-based presentations of classic and current primary literature studies. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: MGG 7020

PSL 7350 Psychosocial Perspectives of Health Care: Premedical Studies Cr. 2
Psychosocial Perspectives of Health Care explores various psychosocial and non-cognitive topics relevant to the personal growth and development of future physicians. The course is designed to prepare students for the psychosocial aspects of medical training and patient care by analyzing practices and workplace scenarios, in which many underrepresented medical students and practicing physicians face. In addition, the course provides students an opportunity to reflect on their journey which led them to medical school, share their life experiences, and recognize any personal biases through class group discussions. Offered Yearly.
Restriction(s): Enrollment is limited to students with a major in Premedical Studies; enrollment is limited to Graduate level students.

PSL 7400 Sleep and Breathing in Health and Disease Cr. 2
This course is designed to expose students to topics in respiratory control during wakefulness and sleep in healthy individuals and individuals with sleep apnea and/or spinal cord injury. Advanced topics in respiratory physiology; guidance in critical reading and discussion of the literature. Offered Every Other Winter.
Prerequisite: PSL 7030 with a minimum grade of C or PSL 7031 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate or Medical level students.

PSL 7420 Organizing and Communicating Hypothesis Testing in Physiology Cr. 3
Understanding the development of physiologically relevant hypotheses, testing hypotheses, and both written and oral presentation of physiologic studies/proposals. Students will develop substantial components of a training fellowship proposal. Offered Winter.
Prerequisite: PSL 7011 with a minimum grade of C and PSL 7031 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7490 Translational and Integrative Physiology Cr. 4
This course focuses on selected, current topics in physiology with the intention of highlighting and bridging basic physiological principles with clinical diseases, diagnostic approaches, or therapies. The course will provide an in-depth, interactive lecture session discussing physiological principles from laboratory to clinic by paired instructors: a basic scientist and a clinician in the respective field (e.g., cardiac physiology/cardiology). The lecture session will be followed by a second session wherein one or two papers that provide either classic or state-of-the-art investigations that are translational in nature and are grounded in the material from the previous lecture session. The course is team taught with faculty who have appropriate expertise in a given area leading the didactic/discussion sessions. Offered Winter.
Prerequisites: (PSL 7010 and PSL 7011) and (PSL 7030 and PSL 7031)
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7550 Advanced Renal Physiology Cr. 2
A detailed study of the physiological mechanisms promoting homeostasis of the body fluid volumes and ionic composition in the mammal. Offered Every Other Fall.
Prerequisites: PSL 7030 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7600 Advanced Cardiovascular Physiology Cr. 2
Basic principles of heart dynamics and control techniques in measurement of cardiac function. Offered Fall.
Prerequisites: PSL 7030 with a minimum grade of C
Restriction(s): Enrollment is limited to students with a major in Physiology; enrollment is limited to Graduate level students; enrollment limited to students in a Doctor of Philosophy or Master of Science degrees.

PSL 7640 Cell and Molecular Physiology Cr. 3
Lecture and discussion. Research in atomic force microscopy, molecular structure, exocytosis, insulin signal transduction, glucose transport, estrogen receptors, ion channels, Na, K-ATPase, Na/Ca exchanger, hormonal regulation of ion transport. Offered Every Other Winter.
Prerequisites: PSL 7010 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7660 Advanced Neurophysiology Cr. 3
Current topics in cognitive neurosciences ranging from cellular and molecular aspects to systems, network dynamics, and cognitive functions as well as neurological diseases. Offered Every Other Fall.
Prerequisites: PSL 7010 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7680 Endocrinology Cr. 4
A detailed emphasis on current research. Student participation encouraged; each student required to present a one hour lecture. Offered Winter.
Prerequisites: PSL 7010 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7685 Reproductive Physiology Seminar Cr. 1
The seminar covers principles and translational components of reproduction and associated disease states including endocrinology, infertility, contraception, recurrent pregnancy loss, menopause, and reproductive immunology. This weekly seminar series exposes students to the work of their departmental peers and faculty, as well as external speakers who are invited monthly, and it aims to broaden the knowledge and expertise of the participating students in the field of reproductive biology. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 4 Credits

PSL 7690 Principles and Techniques of Reproductive Biology Cr. 3
Principles and techniques in reproduction including endocrinology, gametogenesis, fertilization, implantation, embryogenesis, stem cell determination, pregnancy and parturition. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: IBS 7690

PSL 7700 Embryonic Stem Cell Biology Cr. 3
Methods involved in production and utilization of embryonic stem cells. Lectures supplemented with text, reviews, and recent papers. Offered Every Other Winter.
Prerequisite: PSL 7690
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7710 Disease States and Reproductive Processes Cr. 1
Diseases and areas in reproductive medicine where additional research is required. Students accompany clinicians during rounds in hospital and out-patient clinics. Offered Spring/Summer.
Restriction(s): Enrollment is limited to students with a major in Medicine; enrollment is limited to Graduate level students.

PSL 7730 Reproductive Sciences: Teratology Cr. 3
Principles of the science of birth defects; focus on impact of environmental poisons, medicines, and drugs of abuse on developing germ cells, embryos and fetuses. Roles of pharmacological/toxicological, physiological (maternal, placental, and fetal), genetic and nutritional factors in the teratogenic response are examined. Texts and current readings. Offered Every Other Fall.
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: PHC 7730

PSL 7770 Perinatal Biology and Reproductive Immunology Cr. 3
The aim of this course is to introduce students the role of the immune system in the physiology and pathology of the female reproductive system during the non-pregnant as well as the pregnant state. Offered Winter.
Prerequisite: PSL 7690 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7775 Current Research Topics in Reproductive Science Cr. 3
Covers principles and translational components of reproduction and associated disease states including, endocrinology, infertility, contraception, recurrent pregnancy loss, menopause and reproductive immunology. Offered Winter.
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7825 Membrane Physiology: Protein Transport, Lipid Metabolism and Human Diseases Cr. 2
Covers the basic concepts of membrane transport in the mammalian secretory pathway with an emphasis on the dysregulation of key transport steps and the defective mutations of key regulators which lead to human diseases (e.g. neurodegenerative diseases, diabetes and coronary heart diseases). Offered Winter.
Prerequisite: IBS 7015 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7880 Special Problems in Physiology Cr. 1-8
Topics individually arranged with faculty. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 8 Credits

PSL 7890 Seminar Cr. 1
For graduate students in physiology. Participation in weekly departmental seminars. Offered Fall, Winter.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 6 Credits

PSL 7891 Seminars in Physiology Cr. 0
Topics individually arranged with faculty. Offered Fall, Winter.
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7910 Epigenetics and the Developmental Origin of Health and Disease Cr. 3
Numerous animal and epidemiologic studies demonstrate that many adult-onset diseases ranging from cardiovascular disease to mental health may result from environmental conditions, such as famine or chemical exposures, encountered early in life or even prior to conception. This course will cover principles and current and seminal research in the field of developmental origins of health and disease (DOHaD). Topics will include the history of DOHaD; windows of susceptibility in male and female germs cells and early-life development; the numerous environmental factors (e.g., nutrition, toxicants, built environment) that may affect your health later in life; and the mechanisms (e.g., epigenetics) that link early-life environmental conditions to adult-onset diseases. Offered Winter.
Prerequisite: PSL 7730 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

PSL 7996 Arranged Research Cr. 1-15
Graduate level experiences in research techniques. Special research topics in specified areas arranged with individual faculty member. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 15 Credits

PSL 8888 Survey of Research at the Chemistry Biology Interface Cr. 3
The Chemistry Biology Interface course will teach students how to apply chemical approaches to study complete biological processes. It will commence with a basic overview of the biochemistry of biomolecules. Next, complex biological processes related to various diseases will be highlighted by introducing cell biology, model cells and organisms, and disease mechanisms. Finally, the course will highlight contemporary examples of how chemical methods are used to answer complex biological questions to show the value and innovation available by taking a multidisciplinary approach. The focus will be on development of skill sets that are applicable for research at the chemistry biology interface, rigor and transparency in data collection and analysis, and identification of cross-disciplinary research at Wayne State. Offered Winter.
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: BIO 8888, CHM 8888, PHC 8888, PSC 8888

PSL 8999 Master's Thesis Research and Direction Cr. 1-8
Offered Every Term.
Restriction(s): Enrollment limited to students with a class of Candidate Masters; enrollment is limited to Graduate level students.
Repeatable for 8 Credits

PSL 9990 Pre-Doctoral Candidacy Research Cr. 1-8
Research in preparation for doctoral dissertation. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 12 Credits

PSL 9991 Doctoral Candidate Status I: Dissertation Research and Direction Cr. 3-9
Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 9 Credits

PSL 9992 Doctoral Candidate Status II: Dissertation Research and Direction Cr. 1-18
Offered Every Term.
Prerequisite: PSL 9991 with a minimum grade of S
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 18 Credits

PSL 9993 Doctoral Candidate Status III: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: PSL 9992 with a minimum grade of S
Restriction(s): Enrollment is limited to Graduate level students.

PSL 9994 Doctoral Candidate Status IV: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: PSL 9993 with a minimum grade of S
Restriction(s): Enrollment is limited to Graduate level students.

PSL 9995 Candidate Maintenance Status: Doctoral Dissertation Research and Direction Cr. 0
Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 0 Credits