Descriptions — Physical Education and Exercise Science of Courses

892. Topics in Physical Education and Exercise Science (MTC) Fall, Spring, Summer. 3 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. Selected topics in areas such as physiology of exercise, biomechanics, motor behavior, psychosocial aspects of activity, program design and evaluation, and athletic training.

890. Independent Study in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to master's students. Approval of department. Individual study in an area of physical education and exercise science under faculty supervision.

893. Internship in Physical Education and Exercise Science Fall, Spring, Summer. 2 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in Physical Education and Exercise Science. Supervised internship in sports medicine, athletic administration, coaching, or education agencies. Capstone experience option in master's degree program.

894. Field Experiences in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department. Supervised graduate practicum in schools or other settings.

895. Research Ethics Summer. 1 (1-0) Interdepartmental with Teacher Education; Counseling, Educational Psychology and Special Education; and Educational Administration. R: Open only to graduate students in the Department of Counseling, Educational Psychology and Special Education or Department of Educational Administration or Department of Physical Education and Exercise Science or Department of Teacher Education. Identifying and resolving ethical problems in research, including issues related to collegial interactions; authorship, publication, and reviewing practices; data management; ownership of data and intellectual property; conflicts of interest; protection of human and animal subjects; and lab safety and compliance.

897. Project in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to graduate students in Physical Education and Exercise Science. Project experience under the guidance and supervision of MSU faculty. Development of products such as technical reports, instruction manuals, or curriculum materials to address an educationally significant problem. Capstone experience option in master's degree program.

899. Master's Thesis Research Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department. Supervised research leading to a master's thesis. Open only to doctoral students.

900. Current Issues in Psychosocial Aspects of Physical Activity Fall, Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in the psychology and sociology of sport and physical activity.

901. Current Issues in Design and Evaluation of Physical Activity Programs Fall, Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in the design and evaluation of physical activity programs.

902. Current Issues in Motor Behavior Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in motor development, motor learning, adapted physical education, and related fields of study.

903. Independent Study in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students. Approval of department. Individual study in an area of physical education and exercise science under faculty supervision.

905. Research Practicum in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to doctoral students in College of Education. Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

906. Doctoral Dissertation Research Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to doctoral students.

910. Current Issues in Exercise Physiology Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department. Supervised research leading to a dissertation. Open only to doctoral students.

920. Current Issues in Biomechanical Aspects of Physical Activity Spring, Fall. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with Osteopathic Manipulative Medicine. P: PES 830. Selected issues of biomechanical analyses of sport and physical activity.

921. Current Issues in Motor Behavior Spring, Fall. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in motor development, motor learning, adapted physical education, and related fields of study.

923. Independent Study in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students. Approval of department. Individual study in an area of physical education and exercise science under faculty supervision.

925. Research Practicum in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to doctoral students in College of Education. Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

929. Doctoral Dissertation Research Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to doctoral students.

930. Current Issues in Biomechanical Aspects of Physical Activity Spring, Fall. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with Osteopathic Manipulative Medicine. P: PES 830. Selected issues of biomechanical analyses of sport and physical activity.

940. Current Issues in Motor Behavior Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in motor development, motor learning, adapted physical education, and related fields of study.

949. Current Issues in Design and Evaluation of Physical Activity Programs Fall, Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in the design and evaluation of physical activity programs.

960. Current Issues in Motor Behavior Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in motor development, motor learning, adapted physical education, and related fields of study.

969. Current Issues in Motor Behavior Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. Selected issues in motor development, motor learning, adapted physical education, and related fields of study.

990. Independent Study in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students. Approval of department. Individual study in an area of physical education and exercise science under faculty supervision.

100. Research Practicum in Physical Education and Exercise Science Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to doctoral students in College of Education. Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

109. Doctoral Dissertation Research Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to doctoral students.

110. Current Issues in Exercise Physiology Spring. 3-0 A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department. Supervised research leading to a dissertation. Open only to doctoral students.

PHYSICS

Department of Physics and Astronomy College of Natural Science

101. Concepts in Physics Fall. (3-0) Conceptual foundations of physics emphasizing key experiments.

102. Physics Computations I Spring. (1-0) P: CPS 101; PHY 193 or PHY 1838 or PHY 193H or concurrently. Use of computer software to solve, analyze and graph equations and data from mechanics.

170. Investigations in Physics Fall. 3 credits. R: Approval of department. Experiments in optics, electronics, sound and mechanics; analysis of data using computers, library research and oral presentations.

181B. Basic Physics I, CBI Fall, Spring, Summer 3 credits. R: Not open to students with credit in LBS 164 or PHY 183 or PHY 193H or PHY 203 or PHY 231B. Newton's laws of motion, conservation of angular momentum, energy conservation, thermal physics, waves, and sound. Competency based instruction.

182B. Basic Physics II, CBI Fall, Spring, Summer 3 credits. R: Not open to students with credit in LBS 164 or PHY 183H or PHY 193H or PHY 203 or PHY 231B or PHY 231H or PHY 231B. Newton's laws of motion, conservation of angular momentum, energy conservation, thermal physics, waves, and sound. Competency based instruction.

183. Physics for Scientists and Engineers I Fall, Spring. 4(5-0) R: Not open to students with credit in LBS 267 or LBS 184 or PHY 184B or PHY 232 or PHY 232B or PHY 294H. Electricity and magnetism, optical phenomena, interference and diffraction of light, atomic and subatomic topics. Competency based instruction.

183A. Physics I, CBI Fall, Spring, Summer 1 credit. R: Not open to students with credit in PHY 183 or PHY 183H or PHY 193H or PHY 203 or PHY 231B or LBS 164. Mechanics, Newton's laws, momentum, energy conservation laws, rotational motion, oscillation, gravity, waves.

183B. Physics for Scientists and Engineers II Fall, Spring. 4(5-0) R: Not open to students with credit in PHY 183 or PHY 183B or PHY 231 or PHY 231B or PHY 193H or LBS 164. Mechanics, Newton's laws, momentum, energy conservation laws, rotational motion, oscillation, gravity, waves. Competency based instruction.

PHYSICAL MEDICINE AND REHABILITATION

PMR Department of Physical Medicine and Rehabilitation College of Osteopathic Medicine

590. Special Problems Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 24 credits in all enrollments for this course.

Each student works under faculty direction on an experimental, theoretical, or applied problem in physical medicine and rehabilitation.

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184A. Physics II, CBI
Fall, Spring, Summer. 1 credit.
P: PHY 183B. R: Not open to students with credit in PHY 184 or PHY 184B or PHY 294H or PHY 252 or PHY 232B.
Topics from: standing wave phenomena, atoms, electromagnetic fields, alternating currents, optics, quantum mechanics, elementary particles. This course plus PHY 183B is equivalent to PHY 184B.

184B. Physics for Scientists and Engineers II, CBI
Fall, Spring, Summer. 4 credits.
P: PHY 181B or PHY 183 or PHY 183B or PHY 193H or PHY 193H or LBS 164; MTH 153 or concurrently.
R: Not open to students with credit in LBS 267 or PHY 182B or PHY 184B or PHY 22B or PHY 294J.
Electricity and magnetism, electromagnetic waves, light and optics, interference and diffraction. Competency based instruction.

191. Physics Laboratory for Scientists, I
Spring. 1 credit.
P: PHY 181B or PHY 183 or PHY 183B or PHY 193H or LBS 164 or concurrently. R: Not open to students with credit in PHY 251.
Error analysis, exercises in motion, forces, conservation laws and optics.

192. Physics Laboratory for Scientists, II
Fall. 1 credit.
P: PHY 184 or PHY 184B or PHY 191 or PHY 294H or PHY 267 or concurrently. R: Not open to students with credit in PHY 252.
Electric and magnetic fields, circuits, wave optics, and radioactivity.

193H. Honors Physics I-Mechanics
Spring. (4-0)
P: MTH 153 or concurrently. Mechanics and waves.

205. Directed Studies
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course.
R: Approval of department.
Guided individualized study in an area of physics.

215. Thermodynamics and Modern Physics
Fall, Spring. (3-4)
P: PHY 184 or PHY 184A or PHY 184B or PHY 294H or LBS 267. R: Not open to students with credit in PHY 252.
Thermodynamics, atomic physics, quantized systems, nuclear physics, solids, elementary particles.

215B. Thermodynamics and Modern Physics, CBI
Fall, Spring, Summer. 3 credits.
P: PHY 184 or PHY 184A or PHY 184B or PHY 294H or LBS 267. R: Not open to students with credit in PHY 215.
Thermodynamics, atomic physics, quantized systems, nuclear physics, solids, elementary particles. Competency based instruction.

211. Introductory Physics I
Fall, Spring. (3-4)
P: MTH 116 or concurrently. R: Not open to students with credit in PHY 181B or PHY 183 or PHY 183B or PHY 193H or PHY 215B or LBS 164.
Mechanics, Newton's Laws, momentum, energy, conservation laws, thermodynamics, waves, sound.

211B. Introductory Physics I, CBI
Fall, Spring, Summer. 3 credits.
P: MTH 116 or concurrently. R: Not open to students with credit in PHY 181B or PHY 183 or PHY 183B or PHY 193H or PHY 215B or LBS 164.
Mechanics, Newton's Laws, momentum, energy, conservation laws, thermodynamics, waves, sound. Competency based instruction.

212. Introductory Physics II
Fall, Spring. (3-4)
P: PHY 251B or PHY 181B or PHY 183B or PHY 193H or PHY 231B or LBS 164. R: Not open to students with credit in PHY 183 or PHY 184B or PHY 252B.
Electricity and magnetism; optics; atomic, nuclear, and subatomic physics. Competency based instruction.

212B. Introductory Physics II, CBI
Fall, Spring, Summer. 3 credits.
P: PHY 181B or PHY 183 or PHY 193H or PHY 231B or LBS 164. R: Not open to students with credit in PHY 184 or PHY 184B or PHY 252.
Electricity and magnetism; optics; atomic, nuclear, and subatomic physics. Competency based instruction.

223B. Calculus Concepts in Physics I, CBI
Fall, Winter, Spring. 2 credits.
P: PHY 231 or PHY 231B; MTH 132 or concurrently.
Kinematics, dynamics, applications of Newton's Laws, Competency based instruction. PHY 201B plus PHY 201B is equivalent to PHY 183B.

224B. Calculus Concepts in Physics II, CBI
Fall, Winter, Spring. 2 credits.
P: PHY 181B or PHY 183 or PHY 193H or PHY 231B or LBS 164. R: Not open to students with credit in PHY 184 or PHY 184B or PHY 252.
Electricity and magnetism; optics; atomic, nuclear, and subatomic physics. Competency based instruction.

231. Introductory Physics Laboratory I
Fall, Spring, Summer. 1 credit.
P: PHY 181B or PHY 183B or PHY 231 or PHY 231B or PHY 215B or PHY 252.
Laboratory exercises involving simple mechanical systems.

232. Introductory Physics Laboratory II
Fall, Spring, Summer. 1 credit.
P: PHY 251 or PHY 191 or LBS 164. R: Not open to students with credit in PHY 192.
Laboratory exercises involving simple electromagnetic and optical systems.

234B. Calculus Concepts of Modern Physics
Fall, Spring, Summer. 3 credits.
P: PHY 184 or PHY 294H or PHY 252B or PHY 294J.
Equilibrium statistical mechanics and thermodynamics, kinetic theory, phase transformations.

321. Classical Mechanics I
Spring. (3-0)
P: PHY 321, PHY 481.

322A. Classical Mechanics II
Fall, Spring, Summer. 3 credits.
P: PHY 321. MTH 235 or MTH 255H.

331A. Mathematical Physics, CBI
Summer. 3 credits.
P: PHY 321, PHY 481.
Analysis of differential equations and complex variables as applied to problems in quantum mechanics, electrodynamics, and mechanics. Competency based instruction.

431. Optics I
Spring. (3-2)
P: PHY 184 or PHY 184B or PHY 294H; PHY 192; PHY 215 or PHY 215B.
R: Completion of Tier I writing requirement.
Analysis of diffraction, interference, spectroscopy, fiber optics. SA: PHY 331

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Physics - Descriptions of Courses
482. Nuclear and Elementary Particle Physics
Spring, 3(3-0)
P: PHY 472. R: Completion of Tier I writing requirement.

852. Quantum Mechanics II
Spring, 3(3-0)

853. Advanced Quantum Mechanics
Fall, 3(3-0)

854. Quantum Electrodynamics
Spring of odd-numbered years, 3(3-0)

861. Beam Physics
Spring of odd-numbered years, 3(3-0)
P: PHY 820, PHY 841. Particle accelerator theory and design.

862. Condensed Matter Physics
Spring, 3(3-0)

881. Subatomic Physics
Fall, 3(3-0)
P: PHY 851. Application of conservation laws and physical principles to basic quantum mechanical problems in MeV energy range and femtometer size range. Application to nuclear data.

891. Elementary Particle Physics
Spring, 3(3-0)
P: PHY 853. Nonabeliangauge theory, spontaneously broken gauge theory, electroweak interaction, QCD, W and Z boson coupling to quarks and leptons, charm, top and bottom quarks, particle generations.

889. Master’s Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course.
R: Open only to graduate students in Physics.

905. Special Problems
Fall, Spring. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
R: Open only to graduate students in the Department of Physics and Astronomy.
In-depth study of a topic in physics or in astrophysics and astronomy.

902. Topics in Beam Physics (MTC)
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
P: PHY 861. Selected topics in accelerator physics.
Advanced topics in many-body problems, disordered solids, superfluidity, superconductivity, magnetism, or macroscopic systems.

Advanced Reading in Physics
Fall, Spring. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. P: PHY 852, PHY 871.

Quantum Chromodynamics (MTC)
Fall, Spring. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. P: PHY 891.

Hadron-hadron interactions, interaction of hadrons with leptons.

PHYSIOLOGY

Department of Physiology
College of Human Medicine
College of Natural Science
College of Osteopathic Medicine
College of Veterinary Medicine

101. Current Issues in Physiology
Fall. 2(2-0) R: Not open to students with credit in PSL 250 or PSL 431 or PSL 432. Physiological bases of health issues of broad social significance, and new approaches for the treatment of specific disorders.

250. Introductory Physiology
Fall, Spring. 4(4-0) R: Not open to students in Physiology. Function, regulation and integration of organs and organ systems of higher animals emphasizing human physiology.

323. Physiology and Hygiene of the Eye
Fall of odd-numbered years, Summer of even-numbered years. 3(3-0) R: Not open to Physiology majors. Basic anatomy, physiology, and hygiene of the visual system: normal and abnormal visual function, methods of correction, and educational implications.

410. Computational Problem Solving in Physiology
Fall, Spring. 3(3-0) P: PSL 432. R: Approval of department. Quantitative analysis of physiological data: mathematical models, curve fitting, data analysis and interpretation. Problem solving involving exponential and logistic growth. Cerebral blood flow, convective cooling, oxygen consumption, thermoregulation, other applications.