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Chapter 1 : Course Information | Department of Physiology | East Carolina University

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The scope includes risks to volunteers in biomedical research, carers and comforters. The scope often includes risks to workers and public particularly when these impact patient risk" The term "physical agents" refers to ionising and non-ionising electromagnetic radiations , static electric and magnetic fields , ultrasound , laser light and any other Physical Agent associated with medical e. This mission includes the following 11 key activities: Scientific problem solving service: Comprehensive problem solving service involving recognition of less than optimal performance or optimised use of medical devices, identification and elimination of possible causes or misuse, and confirmation that proposed solutions have restored device performance and use to acceptable status. All activities are to be based on current best scientific evidence or own research when the available evidence is not sufficient. Measurement of doses suffered by patients, volunteers in biomedical research, carers, comforters and persons subjected to non-medical imaging exposures e. Measurements to be based on current recommended techniques and protocols. Includes dosimetry of all physical agents. Surveillance of medical devices and evaluation of clinical protocols to ensure the ongoing protection of patients, volunteers in biomedical research, carers, comforters and persons subjected to non-medical imaging exposures from the deleterious effects of physical agents in accordance with the latest published evidence or own research when the available evidence is not sufficient. Includes the development of risk assessment protocols. Surveillance of medical devices and evaluation of clinical protocols with respect to protection of workers and public when impacting the exposure of patients, volunteers in biomedical research, carers, comforters and persons subjected to non-medical imaging exposures or responsibility with respect to own safety. Clinical medical device management: Testing to be based on current recommended techniques and protocols. Carrying out, participating in and supervising everyday radiation protection and quality control procedures to ensure ongoing effective and optimised use of medical radiological devices and including patient specific optimization. Development of service quality and cost-effectiveness: Provision of expert advice to outside clients e. Education of healthcare professionals including medical physics trainees: Contributing to quality healthcare professional education through knowledge transfer activities concerning the technical-scientific knowledge, skills and competences supporting the clinically effective, safe, evidence-based and economical use of medical radiological devices. Participation in the education of medical physics students and organisation of medical physics residency programmes. Health technology assessment HTA: Developing new or modifying existing devices including software and protocols for the solution of hitherto unresolved clinical problems. Medical biophysics and biomedical physics[edit] Some education institutions house departments or programs bearing the title "medical biophysics" or "biomedical physics" or "applied physics in medicine". Generally, these fall into one of two categories: Medical imaging physics[edit] Para-sagittal MRI of the head in a patient with benign familial macrocephaly. Medical imaging physics is also known as diagnostic and interventional radiology physics. Clinical both "in-house" and "consulting" physicists [11] typically deal with areas of testing, optimization, and quality assurance of diagnostic radiology physics areas such as radiographic X-rays , fluoroscopy , mammography , angiography , and computed tomography , as well as non-ionizing radiation modalities such as ultrasound , and MRI. They may also be engaged with radiation protection issues such as dosimetry for staff and patients. In addition, many imaging physicists are often also involved with nuclear medicine systems, including single photon emission computed tomography SPECT and positron emission tomography PET. Sometimes, imaging physicists may be engaged in clinical areas, but for research and teaching purposes, [12] such as quantifying intravascular ultrasound as a possible method of imaging a particular vascular object. Radiation therapeutic physics[edit] Radiation

therapeutic physics is also known as radiotherapy physics or radiation oncology physics. The majority of medical physicists currently working in the US, Canada, and some western countries are of this group. A radiation therapy physicist typically deals with linear accelerator Linac systems and kilovoltage x-ray treatment units on a daily basis, as well as other modalities such as TomoTherapy , gamma knife , cyberknife , proton therapy , and brachytherapy. The thyroid , bones , heart , liver and many other organs can be easily imaged, and disorders in their function revealed. In some cases radiation sources can be used to treat diseased organs, or tumours. Five Nobel laureates have been intimately involved with the use of radioactive tracers in medicine. Health physics is the applied physics of radiation protection for health and health care purposes. It is the science concerned with the recognition, evaluation, and control of health hazards to permit the safe use and application of ionizing radiation. Health physics professionals promote excellence in the science and practice of radiation protection and safety.

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Chapter 2 : Electrodiagnostic medicine - Wikipedia

Human Physiology 5 P: Physiological principles fundamental to living tissue. All body systems studied as they relate to normal and pathological conditions in humans. Foundation in principles of normal function of human body. Emphasis on human physiology. Basic physiological processes in health covered through lectures, conferences, demonstrations, and experimental lab sessions, with special emphasis to integrated nature of organ system function. Membrane Transport Processes 2 P: Calculus; physical chemistry; consent of chair. Current theories of electrolyte and non-electrolyte transport processes at cellular and organ levels. Development of theoretical and experimental evidence underlying modern concepts of bioelectric phenomena. Current concepts of membrane structure, metabolism, resting and action potentials, ionic fluxes, and techniques used in electrophysiological research. Seminars with emphasis on critical evaluation of pertinent original research papers. Renal, Acid-Base Physiology 2 P: Special Topics in Endocrinology 2 May be repeated. Lectures and formal seminar presentation. Graduate Cellular Physiology 3 P: Advanced study of eukaryotic cell function. Emphasis on membrane biophysics, signal transduction, and control of proliferation and differentiation. Graduate Organ Systems Physiology 5 P: BIOC or equivalent; consent of chair. Advanced survey of physiological principles underlying cardiovascular, respiratory, renal, and endocrine systems. Graduate Neuroscience 4 P: Principles of neuroscience including current research at the system, cellular, molecular, and genetic levels. Physiological Proteogenomics 4 P: Provide students with theoretical knowledge and practical guidelines for common techniques used in a wide variety of scientific research, coupled with practical guidelines for designing and interpreting scientific research, including basic principles of experimental design, problem solving, and data organization and presentation. Translational Physiology 3 P: PHLY ; or , ; consent of chair. Translational research bridges gap from research laboratory to clinic. Physiological basis of diseases of cardiovascular, respiratory, and renal systems. Examines integrated function of organ systems and how current research hopes to delay or completely prevent the progression of disease. PHLY ; consent of chair. PHLY , ; consent of chair. Selected topics of current interest. Comprehensive survey of structure and function of human nervous system, including introduction to clinical neuroscience. Lab includes dissection of human brain and study of prosected specimens. Sensory Systems Neurophysiology 3 P: Basic principles of functional organization of somatic and special sensory systems. Emphasis on synaptic processing of sensory information. Collaborative or independent research in variety of physiology specialty areas, including research in preparation for doctoral dissertation. Advanced Topics in Physiology 2 May be repeated. Respiratory Physiology 2 P: PHLY , , , ; consent of chair. Selected topics in lung mechanics, pulmonary function testing, pathophysiology, and pathogenesis. Dissertation May be repeated. May count maximum of 18 s. Summer Research 1 May be repeated. No credit may count toward degree. Students conducting dissertation research may only register for this course during the summer.

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Chapter 3 : Clinical Neurophysiology: Electroencephalography and Evoked Potentials | Clinical Gate

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The only EEG finding that has a strong correlation with epilepsy is epileptiform activity, a term used to describe spikes and sharp waves that are clearly distinct from ongoing background activity. Clinical and experimental evidence supports a specific association between epileptiform discharges and seizure susceptibility. Nonetheless, interpretation of interictal findings always requires caution. Furthermore, a substantial number of patients with unquestionable epilepsy have consistently normal interictal EEGs. Although ictal EEG tracings greatly increase the sensitivity of the study in assessing the pathophysiology of specific behavioral episodes, the clinician must still be aware of limitations inherent in such recordings. In addition to epileptiform patterns, EEGs in patients with epilepsy often show excessive focal or generalized slow-wave activity. Less often, asymmetries of frequency or voltage may be noted. These findings are not unique to epilepsy and are featured in other conditions such as static encephalopathies, brain tumors, migraine, and trauma. In patients with unusual spells, nonspecific changes on EEG should be weighed cautiously and are not to be considered direct evidence for a diagnosis of epilepsy. On the other hand, when clinical data are unequivocal, or when epileptiform discharges occur as well, the degree and extent of background EEG changes may provide information important for judging the likelihood of an underlying focal cerebral lesion, a more diffuse encephalopathy, or a progressive neurological syndrome. Additionally, EEG findings may help determine prognosis and aid in the decision to discontinue antiepileptic medication. Clinically, generalized tonic-clonic seizures may be generalized from the outset or may be secondary to spread from a focus. Lapses of awareness with automatisms may be a manifestation either of a generalized nonconvulsive form of epilepsy absence seizures or of focal epileptogenic dysfunction temporal lobe epilepsy. The initial clinical features of a seizure may be uncertain because of postictal amnesia or nocturnal occurrence. In these and similar situations, the EEG can provide information crucial to the correct diagnosis and appropriate therapy. In generalized seizures of nonfocal origin, the EEG typically shows bilaterally synchronous diffuse bursts of spikes and spike-and-wave discharges Fig. All generalized EEG epileptiform patterns share certain common features, although the exact expression of the spike-wave activity varies depending on whether the patient has pure absence, tonic-clonic, myoclonic, or atonic-astatic seizures. The EEG also may distinguish between primary and secondary generalized epilepsy. In the former instance, no cerebral disease is demonstrable, whereas in the latter, evidence can be found for diffuse brain damage. Typically, primary idiopathic generalized epilepsy is associated with normal or near-normal EEG background rhythms, whereas secondary symptomatic epilepsy is associated with some degree of generalized slow-wave activity.

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Chapter 4 : Neurophysiology | Medical Physiology: The Big Picture | AccessMedicine | McGraw-Hill Medica

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Neuronal growth, regeneration and degeneration and Glial function and neurogrowth factors. LSM Neuronal Signalling and Memory Mechanisms This module will provide fundamental knowledge about how neuronal signaling and its higher functions, such as encoding and retrieval of memory, occur in our brain. Learning and memory mechanisms are conserved in all organisms. This module covers topics including the ionic basis of resting and action potentials, molecular biology of ion and TRP channels, ion channelopathies, and the auditory system. It also focuses on neurotransmission with particular emphasis on the glutamate receptors and neuropharmacology. In addition it touches the cellular and molecular basis of learning and memory, and energy utilization in the brain. LSM Human Ageing This module is designed to introduce 3rd year life sciences students to human ageing theories, molecular basis of ageing, system level effects of ageing, ageing related diseases, and interventions that increase longevity. Major topics to be covered in the first half include biology of ageing theories Oxidative stress, Genetic, Autoimmune and Neuroendocrine , with an emphasis on molecular pathways such as telomere shortening, mitochondrial and ER stress, sirtuins and mTOR and autophagy. The second half of lectures include ageing brain, heart and related diseases, health implications for the individual and interventions that increases longevity such as hormesis, dietary restriction, resveratrol, rapamycin and growth hormones. LSM System Neurobiology The primary goal of this module is to understand how neurons, assembled into circuits, mediate behaviour and pathophysiology of neurons leading to dysfunctional cellular and molecular processes and behaviour. This course draws on basic knowledge of the cell biology and physiology of neurons. LSM Extreme Physiology This module describes how the human body responds to exposure and exercise in environmental extremes such as hypoxic and hyperbaric conditions, thermal stressors, microgravity and trauma. Latest research findings, including some of the controversial topics, will be presented and discussed. Students will understand what the physiological changes are under extreme conditions and how acute and chronic adaptations occur in response to these stresses. This will allow students to appreciate how the human body adapts to changing environments. LSM Advanced Cell Biology This module will explore the changes that occur in animal cells as they grow, mature, differentiate, and either senesce or renew themselves. Insights into the mechanisms that govern how and when particular developmental alterations occur will be discussed. Emphasis will be placed on understanding the cellular molecular mechanisms that lend themselves to experimental manipulation. LSM Tumour Biology This module deals with the understanding of processes that regulate cell growth and proliferation, and the intricate mechanism s that result in abnormal proliferation and oncogenesis. Molecular basis of immortalisation and the acquisition of the neoplastic phenotype, namely oncogene activation, immune evasion, potential for local and distant spread, and resistance to cell death etc. A brief session on target therapies including gene therapy approaches will also be included. Tumour immunology role of inflammation in tumours will be discussed. Medicine A new medical curriculum was implemented for the academic year A hybrid of our traditional system with a more problem-based learning one, the new curriculum has been streamlined to reduce factual overload and emphasizes the relevance of the biological sciences to subsequent clinical practice. A more integrated and systems-based approach has been designed to discourage compartmentalized thinking and to stress problem-solving abilities. The teaching of Physiology is integrated into the Systems Biology track where the functional aspects of the various organ and physiological systems are integrated with structure Anatomy: The traditional lecture-tutorial format will be supplemented by problem-based learning. In the series of lectures for each system, the first lecture provides an overview of the system and its relevance to Clinical Medicine. The last lecture of the system series, after all the basic concepts have been taught, discusses disordered physiology and how basic knowledge is applied to clinical situations. This format provides the

students a relevance, and hopefully a motivation, of studying basic science. The tutorials focus on the basic concepts of each system and use disorder physiology to emphasize important points and to provide a clearer understanding of the main concepts. A number of case studies are used to illustrate the connection between basic physiology and clinical application. In problem-based learning, a patient or basic science problem is used as a trigger and context for students to learn problem-solving skills and to acquire knowledge of basic and clinical sciences through self-directed learning. The teacher functions as a facilitator and students are encouraged to make use of various resources for example: The process also provides a way for improving their communication skills, collaboration and teamwork skills as well as develop a well-structured knowledge base, linking new concepts with existing knowledge. The Blood, Respiratory and Cardiovascular Systems module deals with the principles of normal structure and function of these systems. Students are expected to apply these principles to explain the basis of clinical assessments of these systems and the pathophysiological basis of common diseases including anaemia, bleeding disorders, obstructive and restrictive lung diseases, hypertension, ischemic heart disease, cardiac failure and common valvular defects and rhythm disturbances of the heart. The Renal, Fluid and Electrolyte Systems module covers the basic and applied physiological principles underlying these systems, with an emphasis on integration with Cardiovascular, Endocrine, Gastrointestinal and Respiratory Physiology. The Gastrointestinal, Nutrition and Metabolism Systems module takes the students from non- Pathological to pathological conditions in parallel with progressive teaching of normal to abnormal function and structure. Students will learn to apply functional anatomy, biochemistry and physiology to explain the pathophysiology of common gastrointestinal symptoms and nutritional disorders. The Endocrine and Reproduction Systems module will deal with the normal physiology of the endocrine system as well as the common diseases affecting the endocrine glands: In addition, it will also cover metabolic disorders such as hyperlipidemias, obesity, and osteoporosis. Sex determination and sexual differentiation; Male reproductive system: Details of the stages of spermatogenesis, spermiogenesis, composition of semen, structure of spermatozoa, transport of spermatozoa, erection, copulation, ejaculation, as well as problems of male infertility will be covered; Female reproductive system: Dentistry, Pharmacy and Bioengineering Physiology is the study of biological processes pertaining to life. The Department of Physiology offers modules that focus on human physiology and explore the function of the human body at the organ, cellular and molecular levels. This will cover the basic physiology of major systems in the body. Dental, Pharmacy and Bioengineering students will attend the same lectures and tutorials. The tutorial classes are conducted separately for the three different groups of students. They focus on the basic concepts of each system and use disorder physiology to emphasize important points and to provide a clearer understanding of the main concepts. MDA Physiology The syllabus for the Physiology course includes largely core material on Human Physiology with reference to relevant clinical examples. The course is conducted over two semesters. Topics for the module include:

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Chapter 5 : Medical physics - Wikipedia

Neuroimaging and Neurophysiology in Psychiatry examines the use of brain imaging and non-invasive electrophysiology in psychiatric research and clinical practice. It introduces the physical and physiological principles of neuroimaging (with a focus on magnetic resonance imaging (MRI)), electrophysiology, and non-invasive brain stimulation.

Departments Osteopathic Principles and Practice The Department of Osteopathic Principles and Practice OPP is a collegium of physicians, academicians, ancillary health providers, post graduate Fellows and undergraduate Fellows who are dedicated to the preservation and teaching of the history and philosophy of osteopathic medicine as developed by A. The Department delivers instruction in Osteopathic Medicine to the Year 1 and Year 2 medical students, regular educational programs to Year 3 and Year 4 medical students, Osteopathic Postgraduate Training Institute OPTI interns and residents, as well as continuing medical education. The Department runs two outpatient clinics, is actively involved in research, and delivers lectures and collaborative presentations in the Departments of Family Medicine, Alternative Medicine, Athletic Training, and all Clinical Systems. The Department offers a one year Predoctoral OPP Fellowship to osteopathic students who are interested in the development of advanced skills in manipulative medicine. The Department also runs a one-year post graduate subspecialty residency in Sports Medicine. Department members lecture on national and international levels, and are strongly involved in the preparation of national board examinations. The OPP Department is also heavily involved in national and international community service. First and second year students receive extensive training via lectures and Clinical Osteopathic Practicum sessions. A one-month rotation is available to fourth year osteopathic medical students. Osteopathic training continues into the residency years with NMM workshops for NSU affiliated residents, as well as one-month rotations within the outpatient clinic. Predoctoral Fellowship The Predoctoral OPP Fellowship Program is a unique opportunity that is designed to expand the educational and clinical opportunities for selected students. It expands the medical school training period from four to five years by converting the two-year clinical clerkship into a three-year Fellowship. Each Fellow completes a full complement of clinical rotations, in addition to a twelve-month Fellowship period that is incorporated into the rotation schedule. The Fellows assist in all classroom and practical training activities, as well as the development of, and participation in, research projects. Fellows also provide clinical services under the supervision of faculty members. A Fellowship Certificate is awarded upon completion of the program. The program is designed to provide medical students, interns, residents, and attending physicians with the opportunity for on-site hospital continuing medical education from the NSU-COM campus. For further information, please contact Dr. This group of practitioners uses an osteopathic approach to Sports Medicine. They offer a broad spectrum of non-surgical modalities including OMT, injections, strength and conditioning, and rehabilitation to address musculoskeletal disorders. The Department addresses all aspects of medical care for the athlete. We offer a one-year post-residency fellowship in Sports Medicine, open to AOA primary care board certified physicians. There is first-hand exposure to outpatient and hospitalized patients in an acute rehabilitation setting where the student can examine patients and follow as they receive comprehensive therapy services. In addition, the student will see patients in an office-based practice focusing on musculoskeletal injuries, neuromuscular diseases, nerve injuries, sports medicine, and pain management. They will be able to assist in the delivery of services including OMM, injections, electrodiagnosis, and pain management interventions. The student will assimilate their skills of Osteopathic medicine to comprehensively manage these patients and provide a hands on approach to patient care. Physical Therapy Internship Physical Therapy incorporates biomechanical analysis, orthotics and bracing, rehabilitation, sports medicine, manual therapy and strengthening and conditioning. Internships in Physical Therapy are available. Physical therapy interns have the ability to learn advanced manual techniques and are provided with academic opportunities. Current physical therapists may participate in available continuing education in the OPP department. Physical therapy students will have the

opportunity to work directly with osteopathic physicians and fellows in the clinic. Learning opportunities are available in advanced manipulative techniques, therapeutic exercise, orthotics and bracing, and modalities including laser therapy. Students will have the opportunity to observe acupuncture and injection therapy. In conjunction with the University clinic, students have the opportunity to attend lectures, labs, and journal article discussions on manipulative techniques and medical articles. Ziff Center, 3rd Floor, Suite The direct number is Our Research Activities We are committed to advancing the understanding of osteopathic manipulative treatment OMT as a treatment technique and to understanding how best to train future osteopathic physicians in this skill. To this end, all our members are engaged in research focused on determining mechanisms, efficacy and characteristics of both palpatory diagnosis and OMT. Our research programs attract national and international collaboration. We encourage research involvement by interested students outside of Nova Southeastern University. All Fellows are given additional training in osteopathic research design and methods. Our research projects include:

Chapter 6 : Department of Osteopathic Principles and Practice | NSU

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Chapter 7 : Physiology - School of Medicine - UMASS Medical School

The second edition of this textbook covers the entire subject from the conduction of nerve impulses to the higher psychological functions of the brain.

Chapter 8 : Neurophysiology of Epilepsy - Oxford Medicine

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Chapter 9 : Journal of Neurophysiology - Wikipedia

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