

Title of Program: Doctor of Naturopathic Medicine (N.D.)

Year 1: Term 1

Anatomy and Physiology: The study of the human body and its parts. Structure and functions of organs and tissues, nerve and muscle feedback mechanisms, biological defense mechanisms. **3 Credits**

Molecular Biology and Introduction to Cancer Biology– First half of course covers the synthesis, structure and function of proteins, nucleic acids, and fatty acids, including the structure and function of mitochondrial DNA. Second half of course considers the biology of cancer, growth signals, blood vessel growth, and metastases. The new parasite theory of cancer is also covered. **3 Credits**

Pharmacology and Pharmacy – Distinction between Pharmacy and Pharmacology, drug names and classes, generic drugs, bio-identical hormones, steroids, antihistamines, anti-inflammatory drugs, pharmacy dispensing, compounding pharmacies, therapeutics. Included is a study of Hormone Replacement therapy including Bio-Identical Hormones, **from the standpoint of indentifying synthetic vs natural hormones. 3 Credits**

Term 2

Clinical Medicine – This course presents the elements of taking a patient “history”, and performing “physical examination”. We review the basic steps based upon what symptoms or complaints the patient presents with. This course establishes taking the patient history as the heart of clinical medicine, and though the student may not be involved directly with patient treatment, these elementary concepts are central to good medical management. Medical history and records are examined in terms of storage, indexing, retrieval, regulatory compliance and privacy. A helpful course for those whose careers may lead to association with an allopathic physician interested in delivering integrated or complementary medicine. **3 Credits**

Pathology (1)- General: General Pathology topics include Cellular response to injury, inflammation, Hemodynamic disorders, Diseases of the Immune System, Neoplasia, Infectious disease. **3 Credits**

Pathology (2) – Systemic: Topics include Blood Vessels, Heart, Diseases of White Blood Cells, Lung, Pancreas, Urinary Tract, Bones, Skin, Eye. **3 Credits**

Term 3

Medical Embryology, Obstetrics and Gynecology– The course is challenging in its undertaking. For the Medical Embryology section: Consideration of the development of a complete organism from a single fertilized zygote, **with emphasis on the development and identification of human stem cells.** The course covers differentiation, types of early developmental cells, in vitro fertilization, the development of blast cells and germ layers, as well as **the development of antigenic determinants as related to fetal stem cells.** The Obstetrics and Gynecology portion is more clinically oriented toward issues of the sort encountered in a general medical practice, with emphasis on complications of child birth, as well as vaginal infections and vaginal cancer. Typical equipment for an OB/GYN practice is reviewed. **3 Credits**

Medical Immunology-The physical, chemical, and physiological characteristics of the human immune system, in vitro, in situ, and in vivo. Humoral and cellular immune response, autoimmune disease, hypersensitivities, immune deficiency, and transplant rejection. Course includes the study of immune modulation using natural substances. **Immunology as it relates to stem cell therapy is studied. 3 Credits**

Infectious Disease- The 4 main types of infectious agents are studied: Bacteria, Virus, Fungus, Parasites, including some aspects of infection at the molecular level, as well as clinical presentations and treatments. **3 Credits**

Year 2: Term 1

Pediatrics and Family Medicine- Case studies and patient health encounters typical of a pediatric and family practice clinic. May include overview of a family practice clinic and/or introduction to critical care medicine. **3 Credits**

System Disorders -In this course we will look at disease presentations at the patient level. We will use one of the most popular and most widely used training texts in the world, Kumar and Clark's Clinical Medicine. Selected chapters are covered that involve the systems irregularities most often presented in the family practice or out patient clinic. **3 Credits**

Diagnostic Procedures- The course covers diagnostic procedures relevant to the practice of naturopathy, and includes blood testing and analysis, as well as operating a walk in lab, which includes the basic set up of a medical lab, types of tests done, how some representative medical lab tests are performed, and manual vs automated blood analysis, Laboratory values and Concentrations. Emphasis is also placed on patient home testing such as Saliva testing for hormones, urine testing, hair, buccal swabs. The very important topic of clinical nutrition is covered with particular emphasis on **Nutritional Diagnostics** to analyse nutritional status, and replacement therapies to correct defects. **3 Credits**

Term 2

Stem Cell Biology – The course begins with an overview of stem cells and the early history of embryonic stem cell research. We then proceed to a review of the techniques of using stem cells derived from human fetal tissue, and what diseases can be particularly controlled or cured. The course also includes a review of the current status of human embryonic stem cell treatments, why the international medical community has abandoned its interest in using embryonic stem cells, and also covering the two major drawbacks to embryonic stem cell therapy: Tendency toward proliferation (differentiation), making stem cells almost impossible to control once injected into another body, resulting in a differentiated cell ball of many types referred to as a teratoma; and the problem of cell rejection due to having “foreign” cell membrane antigenic determinants requiring a patient to take immune suppressing drugs. **3 Credits**

Autologous Stem Cell Therapy- The course covers international treatments available using autologous stem cells (collected from the patient). The primary international treatment centers are reviewed. The mechanism of action is studied. The purpose of the course is to bring to light the many curative techniques being used internationally, such as the repair of severed spinal cord using neural stem cells isolated from the patients nose. It is hoped that the student can gain insight to the fact that these current international treatments are no longer “hypothetical”, and hopefully will inspire the students to generate their own ideas for future work in their careers **3 Credits**.

Growth Media, Growth Factors, and Paired Mice Experiment- This course presents a review of growth media for purposes of expansion of a patient's collected stem cells, including with the use of autologous serum. The importance and identity of stem cell growth factors is presented in context to the very important paired-mice experiment. The course concludes with a discussion of exogenous growth stimulants such as Neupogen (filgrastim). **3 Credits**.

Term 3

Exosomes and the Rise of Birth Tissues. The biology, function, and biomedical applications of exosomes and extracellular vesicles is studied with emphasis on applications in stem cell therapy. This very important course expands on the findings of the “paired-mice” experiment to the effect that serum factors and not stem cells are the most important contributing element to achieving, boosting, and stimulating the body's own natural repair mechanisms toward the control of our most debilitating diseases. And the most important source of exosomes is “birth tissues”: amniotic fluid, placental tissues, umbilical cord blood, and Wharton's jelly. **3 Credits**.

Plant Exosomes- This course introduces the exciting field of Plant Exosomes, what they are, isolation, characterization, therapeutic modalities in vitro and in vivo. Why and how plant exosomes are well adapted to transdermal delivery. **3 Credits**.

Plant Exosomes Lab- Close study of isolation techniques, plant microvesicles, nano-vesicles, lab equipment and costs and efficacy of different procedures compared. **3 Credits**

Year 3: Term 1

Practicum: Bioidentical Hormones and Natural Medicines. The student will view alternative medicine in a practical manner. First, we review the pharmacology of selected natural medicines using our Natural Medicines text. This reference text takes an in-depth and scientific look at various classes of **botanical extracts** such as alkylglycerols and fish oils, as well as presenting reference material on many specific botanicals and herbs. Second, we look deeply into treatment considerations of **bioidentical hormones**, with emphasis on female perimenopause utility of progesterone and estrogen supplementation. Lastly, our staff takes you through some **alternative medicine approaches that do not involve supplements**. **3 Credits.**

Colloquium- Wellness centers and partnering. Course content changes regularly but is intended to cover the following four topics: Operating a wellness center; partnering integrating with an allopathic physician to provide complementary, and/or holistic medical care; operating a counselling clinic; consideration of industry recognitions and certifications. **Medical History and Records Procedures.** It is an interesting "how to" course intended to give you a head start on your naturopathic career. Website models by authoritative practitioners are studied. **3 Credits**

Research- Basic and Clinical. The Scientific Method, **analysis of research papers, Form and Citation**, Clinical Trials, Single Patient Clinical Trial, Institutional Review Board Trial, off label and compassionate use trial. How to perform "clinical trials" of herbal and plant extracts. The course forms the foundation for the later Independent Study course. **3 Credits**

Term 2

Laboratory I: Botanical Extracts. The first purified plant extract, aspirin, is compared to the current formulations of herbal supplements, why herbal remedies do not work very well, the important differences between supplements containing dried plant leaves and roots vs supplements containing purified active ingredients, what do we mean by "100% purity". Active ingredients of plants and plant derivatives, what to look for in obtaining botanicals, what they do, dosages, and indications. Included is the presentation of herbal compounding. Also presented is contamination in the herbal pipeline, sourcing of herbal supplements via wholesale marketers on sites such as Alibaba, the status of Chinese herbal science and how to source plant extracts from reputable companies, and the concept of herbal compounding. **3 Credits**

Laboratory II: Purification. The isolation, characterization, and purification of plant extracts. The student examines the latest equipment, such as HPLC (High Performance Liquid Chromatography), spectrographic analysis and equipment. Cheaper separation techniques you can use. The further purification of extracts via crystallisation. The use of the new membrane filtration techniques to remove water and increase the concentration of extracts in solution. **3 Credits**

Laboratory III: Transdermal delivery of herbal medicines. The student examines the growing popularity and use of transdermal delivery of medicines, with emphasis on how to apply this new delivery system to herbal extracts. Transdermal may be via a "patch", or via specialized gels and creams first formulated for the delivery of bio-identical hormone replacement therapies. Actual formulations of delivery systems are studied, as well as sub-contracting supplier labs, how to formulate products on your own, where to obtain the special transdermal pharmaceutical grade gels. With no textbook available on this subject anywhere, the student, with faculty guidance, will do internet research to locate relevant published papers in order to piece together the current state of the art. **3 Credits**

Term 3

Independent Study: With the guidance of Faculty, the student will select a topic for further research in the nature of a thesis, and prepare a research paper of a quality suitable for publication. With further Faculty guidance, the research paper will be submitted for publication in a relevant journal or scholarly publication outlet. Topics will be suggested by the Faculty that are cogent and advance the field of naturopathic medicine in some way. **9 Credits**

Total: 81 Trimester Credits