Neuroscience is a dynamic, rapidly growing field devoted to study of the central and peripheral nervous systems in health and disease. During the past three decades, a group of eminent scientists with research interests in many areas of neuroscience has been assembled in the basic science and clinical departments of the Medical College of Wisconsin. These individuals, who have an impressive record of pre-and post-doctoral training, research, and extramural funding in the neurosciences, form the core faculty for this training program. The research areas of the neuroscience faculty include functional imaging, electrophysiological, biochemical, cellular, and molecular approaches to questions of fundamental and clinical importance.

The Neuroscience Doctoral Program (NDP) is committed to providing a specialized education in neuroscience ranging across molecular and cellular mechanisms, systems neuroscience, and brain imaging. This education is designed to serve the students well as they move on to pursue specialized research projects. During the first year, students take a core curriculum designed to provide a foundation in neuroscience as well as biochemistry, cell biology, genetics, molecular biology, physiology, signaling, laboratory techniques, and biostatistics. Students also take 4-6 credits of elective courses and a summer course on general writing to help with the qualifying exam and professional development.

A novel aspect of the NDP is that students will be provided with a hands-on Techniques in Neuroscience program, an immersive 6-week program designed to create an on-ramp for new students to the major techniques and skills they will need for their careers in Neuroscience. Through hands-on, interactive sessions, first-year NDP students will be introduced to 1) Molecular techniques in neuroscience, 2) Microscopy and image analysis, 3) Electrophysiology in the neurosciences, 4) Animal behavioral models for neuroscientific investigation, 5) Basics of Python for data analysis, and 6) Introduction to Human Subjects Research. This program also offers several opportunities for students to engage directly with NDP faculty instructors. Opportunities include social events, conversation-focused seminars, and shadow opportunities. These relationship-building events were designed to facilitate students' transition into their lab rotations by allowing them to familiarize themselves with potential research programs and build connections with faculty members crucial to their doctoral training. It also provides a platform for increased visibility of NDP

Physiology; Microbiology and Immunology; or Pharmacology and Toxicology. In addition, students may also pursue a clinical focus if admitted into the Basic and Translational Science Program. Additional information about individual departmental programs is given elsewhere in this publication.

During the second year of their studies, students will take a course in writing an NIH-style fellowship and prepare and defend a proposal based on their own research that will provide them with valuable experience in mastering a scientific problem, formulating a suitable hypothesis, and drafting a feasible and productive experimental scheme with which to test it. The qualifying exam for NDP students will be administered by the graduate program that their thesis laboratory is affiliated with (e.g., Biochemistry; Biophysics; Cell and Developmental Biology; Physiology; Microbiology and Immunology; or Pharmacology and Toxicology*)*. SaatDu. (o)-5 (x8)3 (yD)4.;( )10(o)-5 ee-0crG(l(n)-2 (d)-5 (ent)-1 3 (c)m(ND)4 G(l(nj1 (m)-2

dissect mechanisms of development, signaling, and disease associated with vison, learning and memory, and addiction.

- Function of Neural Systems in Normal and Disease states

Sleep disruption, breathing, chronic stress, reward and drug abuse systems, hearing, touch and temperature sensation and chronic pain are studied using diverse model systems and approaches.

1 credit.

This course reflects student's participation in laboratory research rotations and their attendance at seminars and/or journal clubs.

3 credits.

This is a didactic based course that will provide the background for understanding the biochemical basis of life. Students will learn about thermodynamic principles that drive biochemical and enzymatic reactions, protein structure and protein dynamics and the thermodynamic principles that define these structures and their interactions with other biomolecules, the principles that define their functional activities and then an application of this knowledge to an understanding of metabolic pathways. Students will also learn how foundational biochemical principles apply to certain physiological settings in health and disease and how pharmacological intervention can modulate physiological responses. The format of the course involves lectures and review sessions which are designed to promote class discussion of the relevant material.

3 credits.

An interdisciplinary course that provides students with a foundation in the areas of gene expression, and basic and contemporary issues in cell biology. The material is primarily presented in lecture format, but a significant number of paper discussion sessions are also included.

3 credits.

Module III builds on the cell biology fundamentals introduced in the latter part of Modules I and II. This course starts with three lectures on cell signaling and a discussion of a primary research article on the topic. This forms the basis of Exam 1. The second part focuses on proteins specialized for ion flux and transport. Themes are exemplified by case studies on several diseases that affect either epithelial transport or excitable cells. Exam 2 captures this material. The third and last part of the course focuses on DNA homeostasis, genetic principals, the basis of stem cells and cancer. Exam 3 closes out the Fall semester.

3 credits.

This course is designed to give students fundamental introductory concepts impacting the fields of Microbiology and Immunology, Neurobiology and Pharmacology in three modules. Topics were selected and the three modules integrated based on the essential concept that human biological responses and development are shaped by chemical cues. The impact on human biology from contact or colonization with microorganisms and the innate and adaptive immune responses to contact are discussed in the first module. Module 2 focuses on the physiological aspects of how signals are perceived and interpreted by the human nervous system. Module 3 communicates fundamental aspects of pharmacology, emphasizing the molecular and cellular levels of signaling and signal transduction. Each

session was designed to incorporate current analytical methods, computational and statistical aspects of data analysis and clinical or practical impacts on human health and disease.

2 credits.

The primary objective for this course is to provide information and conceptual knowledge of a number of the most common techniques required for biomedical research. The information presented in this course should facilitate comprehension of the scientific literature and introduce procedures that students will commonly use in their research projects. The lecture materials will present the theory behind each technique, the practical limitations of each technique and the questions that each technique addresses. Additional lectures will assist the student in use bioinformatics and biostatistics methods and in preparing

Professional Development follows a multidisciplinary approach to promote individual career development in the biomedical sciences. The course includes lectures, discussion, sessions, seminars, and hands-on activities. Topics of particular emphasis are oral and written communication and rigor and ethics in scientific research.

1 credit.

This course will present a step-by-step approach to putting together a scientific paper. Students will be divided into groups of 3, and these groups will stay together for the duration of the course. Each group will be given an identical set of data with which to compose a manuscript. Each week, a different aspect of paper writing will be discussed, and students will be given a take home assignment to write that particular component of the paper within the small groups. In the final week of the class, the finished papers will be peer reviewed by 2 other groups and a member of the faculty. The course will be graded on attendance, successful and timely completion of the assignments and evaluation of the final manuscript.

. 2 credits.

Prerequisite: 16292 Writing a Scientific Paper

This course provides a systematic approach towards writing a F31-like individual research fewahept (a)3 ()-2 (653)-1 (h 1)4 (68c)-3 (e,)-3( )10(in(la)3.1u)-2 (a)3 ((es)-2 (he a)13 o)-5 (f)4 (c)-3 a

learning and retrieving concepts, comprehending, and producing language, directing, and maintaining attention, and recognizing sensory objects. Each session in this course will begin with a 1-hour contextual lecture, followed by review and discussion of two relevant landmark papers, sometimes with opposing views. Emphasis will be placed on understanding the processing models central to each dovie.3 (p)2 (.)n she