ILLINOIS WESLEYAN UNIVERSITY

Application for SPECIAL INTERDISCIPLINARY - MAJOR OR MINOR

Your name: Sarah Hartman Date: 4/25/11 (signed) 8/26/11

Your ID #: 900218887

I wish to apply for a (circle) **SPECIAL INTERDISCIPLINARY - MAJOR or MINOR** in the following

Special Interdisciplinary Major

Neuropsychology

Special Interdisciplinary Minor

to be administered under the **Department(s), School(s) or Program(s)** of
(two sponsors are required)

Biology - Dr. David Bollinger (chair)

Psychology - Dr. Joe Williams (chair)

I plan to complete a (circle) **BA** in the (circle) **FALL SPRING MAY SUMMER TERM** of 2012 (year).

Current GPA 3.93 Total course units earned to date: 27 (total) 15.5 in credit hours proposed Major

Present Major (if any) Biology

N.B. It is **NOT** possible to double major between the College of Liberal Arts and the College of Fine Arts, or between one of these and the School of Nursing. Any such requests must be to seek **two degrees**, which will require at least an additional nine unique course units beyond the highest number required for one degree.

Information and Rationale for Proposed Program

Please provide the information required on the other side of this form, attaching additional sheets when necessary.

1. Briefly list the academic goals to be achieved by your proposed program of study. Describe how this program of study better serves your academic goals than any existing major (or minor) program.

(see attached sheet)

2. Attach a list of the proposed Special Interdisciplinary Major or Minor sequence, indicating which courses have yet to be completed. (Majors must include at least ten courses from at least two departments, and a senior project.)

3. If there are any requirements or procedures for which an exemption is desired, state the reason for desiring the exemption and the means by which it is believed that the intent or spirit of the academic requirement has or will be fulfilled.

(see attached sheet)

AUTHORIZATION

After completing the above information, obtain the following signatures in order.

1. Your Signature _____ Date 4/25/11

2. Chair/Director _____ Date 4/26/2011
(of the co-sponsor of the special interdisciplinary major or minor - required)

3. Chair/Director Joe Williams Date 4/26/11
(of the co-sponsor of the special interdisciplinary major or minor - required)

4. Faculty Advisor Joe Williams Date 4/26/11
(of the special interdisciplinary major or minor - required)

For processing by Curriculum Council, please deliver form and attachments to the Mellon Center, LL Stevenson Hall.

Chair of Curriculum Council _____ Date _____

Date Filed with the Registrar _____

Received by Registrar _____

NEUROPSYCHOLOGY

Interdisciplinary Proposal

Sarah B. Hartman

Neuropsychology is an interdisciplinary field that examines the relationships between neurobiology, behavior, and psychological phenomena. The academic goals of this program include:

- Combine studies in psychopharmacology, genetics, and systems neuroscience, with behavioral neuroscience and cognitive sciences.
- Gain an understanding of the brain and behavior from the macro-level to the micro level. (e.g. brain regionalization, cellular communication, neuronal cellular signaling, genetic synaptic plasticity)
- Expose me to both basic and applied scientific perspectives in neuropsychology.
- Provide an understanding of normal adult behavior, as well as behavioral consequences of brain injury, neurobiological abnormalities, and drug actions.
- Provide a foundation and experience in pursuing neuropsychology research.
- Provide a background conducive for competitive entry and success in medical school and in pursuit of related occupations in the medical field (i.e. neurosurgery, neurology, psychiatry)

I am specifically interested in pursuing Neuropsychology toward the goal of obtaining a medical degree and specializing in a neuroscience. I would like to conduct neuroscience research as a physician, while studying to become a neurologist or a neurosurgeon. These specializations both require thorough understanding of brain structures and functions, and their relationship to behavior. Therefore, the courses selected for a Neuropsychology major emphasize brain structure, function, and behavioral correlates. During my previous years at IWU, I have selected courses with this focus in mind, and I believe that I have designed a cohesive curriculum to suit my unique interests and career trajectory.

As an example of my interest and commitment to the study of neuropsychology, I spent my most recent summer interning at the University of Illinois Chicago Medical Center Department of Neurology. I worked 20 hours/week with the Magnetic Resonance Research Laboratory as a research assistant to Dr. Deborah Little. I investigated the relationship between cerebellar diffuse axonal injury and neurobehavioral function following traumatic brain injury (TBI). We used Diffusion Tensor Imaging (DTI) data analysis of MRI data, plotting regions of interest in the medial, superior, and inferior regions of the cerebellar peduncle. I have just completed an extensive literature search of cerebellar and TBI for the introduction to the first publication from this research, which is in the process of final journal submission.

In a second study, I collected additional DTI data on patient MRIs to examine structural layers of the corpus callosum and their differential sensitivity to shearing

and axonal injury in brain trauma. I also determined specific brain atlas regions highlighted on functional MRI slices of transgenic mice that were exposed to standard or enriched environments to serve as a model for Alzheimer's disease.

Working with Dr. Little, I gained firsthand exposure to clinical neuropsychology and neuropsychological research in a study investigating the differences between specific brain regions among individuals with Alzheimer's disease (AD), those with mild cognitive impairment or vascular dementia, and healthy controls. I completed HIPAA training and IRB education and was trained to independently administer required neuropsychological tests including the Mini-Mental, the Alzheimer's Disease Assessment Scale (ADAS), and the Dementia Rating Scale (DRS). My internship included practice administering and scoring neuropsychological tests and textbook study as to the neural processes measured by each. I had the opportunity to observe the test battery being administered to participants and attend their MRI's at the UIC Medical Center clinic. My experiences doing neuroscience research provided me with valuable real-world experience and co-authorship of a peer reviewed journal submission.

In addition to my experiences this summer, I studied in Denmark during a 2010 semester abroad and participated in a field study at the Center of Functionally Integrative Neuroscience located in Århus Sygehus at Aarhus University Hospital. At the Center, I learned about forefront research projects and state-of-the-art neuroimaging technology.

Overall, my research and clinical experience in neuroscience and neuropsychology provide a strong supplement to the academic curriculum I have designed. I am looking forward to studying neuropsychopharmacology this semester, and exploring new territory in my research thesis. This semester, I am excited to be conducting research with Professor Gregory Tinkler. We are investigating the role of a progesterone metabolite, allopregnanolone, in learning and memory processes. We plan to conduct a series of behavioral tests on rats receiving neurosteroid injections/placebo to determine which of allopregnanolone's cognitive and behavioral effects are due to its anxiolytic properties, mediated at GABA-A receptors, and which are directly due to effects on learning and memory pathways. Our investigation holds implications for the safety and efficacy of hormone replacement therapy.

I am very excited about the unfolding of my Neuropsychology studies and my future career. It is my hope that the Committee will support me in graduating with this unique and exciting Major. Thank you for your time and consideration.

Major Sequence

GENERAL BIOLOGY WITH LAB (BIOL 101, BIOL 102) Completed. Grade: A-, B+
Provides foundation for understanding biological forms and functions in the context of evolution. Includes discussion of nervous system and neurobiological functions in humans and in animals.

ADVANCED BEHAVIORAL NEUROSCIENCE (PSYC 313) *Writing Intensive.*
Completed. Grade: A
Provides opportunity for a through investigation of psychobiological mechanisms neurological proponents in learning, perception, and memory. Topics range from discussion of specific brain regions and pathways in the hippocampus, amygdala, and prefrontal cortex. Further discussion is devoted to understanding the cellular and molecular basis for learning and memory. Labs provide an introduction to equipment and procedures involved in neuroscience research, including EEG, GSR, EMG, slide preparation of brain tissue, and animal surgery. For my independent research paper (15 pages), I investigated the hypothesis of whether abnormalities in signal transduction pathways provide a unified explanation for the cognitive and affective profile of Bipolar Disorder.

NEUROPSYCHOPHARMACOLOGY (PSYC 302)
Will be completed in Fall 2011.
Investigates the biological actions of drugs and chemicals in the brain and examines the behavioral effects produced by these interactions. Provides understanding of pharmacokinetics and cellular pathways acted upon by varying chemical agents.

INTRODUCTION TO CELLULAR AND MOLECULAR BIOLOGY (BIO 240)
Will be completed in Fall 2011.
Provides an introduction to cellular biology and molecular mechanisms of cell signing and cell communication.
**See addendum.*

STATISTICS (PSYC 290) Completed. Grade: A
Enhances understanding of primary literature and provides tools to analyze and report statistical research findings.

RESEARCH METHODS IN PSYCHOLOGY (PSYC 300) *Writing Intensive.* Completed.
Grade: A-
Provides foundation for conducting original research to investigate hypotheses and study neuropsychological phenomena in a controlled environment. For my extensive research paper (19 pages), I designed a study to characterize the neuropsychology of trichotillomania (TTM), testing whether deficits in emotion perception are present in TTM and may be correlated to specific brain regions of abnormality. Course provides valuable experience for designing research, analyzing results using SPSS, and drawing conclusions from data.

GENETICS (BIOL 312) Completed. Grade: B
Provides understanding of DNA replication, gene transcription/translation, genetic inheritance, and other genetic activities relevant in understanding the impact of specific gene-based processes involved in neurological processes i.e. long-term potentiation and synaptic plasticity.

LEARNING AND CONDITIONING (PSYC 211) Completed. Grade: A
Provides an understanding of pattern and theories of behavior. Lab provides experience with behavioral training and conducting behavioral tests and in preparation for animal behavioral research.

GENERAL CHEMISTRY WITH LAB (CHEM 3700, CHEM 3701)
Completed at Sarah Lawrence College. Grade: A, B+
Provides basic understanding of chemistry as a foundation for relevant biochemical processes.

ORGANIC CHEMISTRY WITH LAB (CHEM 223, CHEM 312) Grade: B, TBA
First semester Completed at University of Illinois Chicago, Summer 2010.
Second semester to be completed at IWU in Spring 2012.
Provides understanding of organic chemical building blocks and the reactions that drive biological processes.

GENERAL PHYSICS WITH LAB (PHYS 101, PSYS 102)
Will be completed in Fall and Spring of 2012
Provides understanding of the physical forces that govern neural substrates and neurochemical reactions.

INTRODUCTION TO DEVELOPMENTAL COGNITIVE SCIENCE (PSYC 3713)
Completed at Sarah Lawrence College. Grade: A
Provides an understanding of developmental models of cognition, language, and perception from both empirical and theoretical perspectives. Course includes critique of primary literature and is supplemented with bi-weekly collaboration with a professor to provide guidance and discuss progress for an independent study on a topic of my choosing. I wrote and presented a 26-page literature review titled Music and The Brain.

BIOMEDICAL ETHICS (DIS 300) Completed through DIS Study Abroad. Grade: B+
Provides an understanding of ethics as it relates to scientific and biomedical research.

HUMAN HEALTH AND DISEASE: A CLINICAL APPROACH (DIS 302)
Completed at the Danish Institute for Study Abroad. Grade: A.
Course will provide an opportunity for clinical exposure and study of neurology in the context of medicine. The curriculum provides valuable hands-on medical experience such as patient cases and clinical lab exercises, and insight into clinical

practices and health provision in a variety of countries. Curriculum includes conducting neurological exams, clinical history, physical exams, and medical procedures such as lumbar puncture and IV insertion. Field studies include visits to the Center of Functionally Integrative Neuroscience located in Århus Sygehus, Denmark at Aarhus University Hospital, and to Helios Klinkium, in Berlin, Germany—both are at the forefront of neuroscience and neurology research.

DIRECTED RESEARCH/THESIS IN PSYCHOLOGY. *Writing Intensive.* (PSYC 400, PSYC 401)
Will be completed in Fall and Spring of 2012
Provides an opportunity for me to synthesize my knowledge and demonstrate competence via conducting original neuroscience research with a faculty member.

Addendum
Introduction to Cellular and Molecular Biology will be taken as a lecture course for 1.00 credit hours, without lab and writing intensive components. This has been approved by Dr. Loni Walker, the professor who teaches the course, as well as both biology and psychology department chairs, Dr. David Bollivar and Dr. Joe Williams. The purpose of this is to allow the course to be taken during the fall 2011 semester in conjunction with demanding courses that also emphasize lab and scientific writing (i.e. Directed Research Thesis, Physics with Lab, and Neuropsychopharmacology.)