Proposal

Bachelor of Science in Neuroscience

Psychology Department
College of Arts and Sciences
University of Hawaiʻi at Hilo

October 1, 2013
## Table of Contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>3</td>
</tr>
<tr>
<td>Institutional Context: Mission and Organization Structure</td>
<td>4</td>
</tr>
<tr>
<td>Program Goals and Objectives</td>
<td>7</td>
</tr>
<tr>
<td>Program Need and Justification</td>
<td>8</td>
</tr>
<tr>
<td>Anticipated Student Demand, Recruitment and Enrollment</td>
<td>9</td>
</tr>
<tr>
<td>Relationship to Similar Programs in the UH System and State</td>
<td>10</td>
</tr>
<tr>
<td>Program Curriculum and Requirements</td>
<td>11</td>
</tr>
<tr>
<td>Delivery Formats</td>
<td>13</td>
</tr>
<tr>
<td>Program Admission and Transfer</td>
<td>14</td>
</tr>
<tr>
<td>Advising</td>
<td>16</td>
</tr>
<tr>
<td>Assessment of Student Performance and Program Effectiveness</td>
<td>16</td>
</tr>
<tr>
<td>Resources Required and Resources Available</td>
<td>17</td>
</tr>
<tr>
<td>Academic Cost and Revenue Projection</td>
<td>19</td>
</tr>
<tr>
<td>Explanation of Cost and Revenue Projection</td>
<td>23</td>
</tr>
</tbody>
</table>

**Appendices**

- Appendix A: Faculty Curriculum Vitae                                   | 25   |
- Appendix B: Summary of Faculty Qualifications                          | 42   |
- Appendix C: Curriculum Map                                              | 44   |
- Appendix D: Sample 4-Year Graduation Plan                               | 46   |
- Appendix E: Letters of Support from Contributing Departments and Social/Natural Science Division Chairs | 47   |
- Appendix F: Letter of Support from Chair of UH Manoa Undergraduate Psychology Department Chair, Lorey Takahashi | 52   |
Executive Summary

Neuroscience is a field of science that focuses on the study of the nervous system. Although neuroscience is a relatively new scientific discipline in its own right, elements of neuroscience research have been present in various academic departments for over two centuries. The Society for Neuroscience (SfN), was founded in 1981 to provide a common forum to discuss current research on neuroscience and increase public awareness of the importance of studying the brain. While initially a small organization, SfN has grown to include over 40,000 members and represents one of the largest professional societies in the world. Neuroscience, as a whole, has seen unprecedented growth over the past three decades and there is every indication that this growth will continue in the near future. For example, on April 2, 2013 President Obama presented a new “BRAIN” Initiative Research Program that includes 100 million dollars in funding to develop and improve our knowledge of the human mind and our ability to understand and treat brain disorders and traumatic brain injury (www.whitehouse.gov/infographics/brain-initiative). Following the creation of SfN, academic departments across the United States began to develop neuroscience programs, traditionally housed in Psychology and/or Biology Departments. There are a variety of reasons for the growth of Neuroscience, including: advances in the understanding of communication between neurons and within the brain, a better understanding of the relationship between brain and behavior, development of new technologies (e.g. functional Magnetic Resonance Imaging), an increase in neurodevelopmental disorders such as autism, and an unprecedented aging population who are at risk for developing neurodegenerative diseases such as Alzheimer’s and Parkinson’s Disease. As such, institutions around the United States have developed and/or are developing undergraduate and graduate programs in neuroscience to meet this ever-increasing demand.

The development of an undergraduate Neuroscience Major at UH-Hilo has been a topic of discussion within the Psychology Department for several years, although the personnel resources to offer the full curriculum within the field of neuroscience were not present until recently. The initial development of this plan came about as a mechanism to meet the needs of students who were interested in specializing their studies and future careers in the biological aspects of Psychology. An additional motivation for the development of this major includes the fact that Psychology, as a discipline, is evolving to include the identification of biomarkers for both normal development and disease specific pathology. This is also evident at the level of major research funding organizations, such as the National Institutes of Health, who now routinely issue Requested Funding Announcements for mental health research that includes the identification of novel biomarkers. Thus, in order to be cutting edge and competitive, Psychology Departments are increasingly including neuroscience in their offerings.

As an undergraduate major at UH-Hilo, a B.S. in Neuroscience will be a unique major in the UH system as well as among other private colleges in the Hawaiian Islands. The Neuroscience Major will provide an attractive opportunity for UH Hilo students to develop skills and knowledge that will enable them to be more competitive than at present for a variety of graduate programs focused on the biological aspects of
psychology (e.g., Neuroscience, Learning, Cognitive Psychology, Cognitive Development, Biopsychology). It will also better prepare undergraduate students as potential candidates for medical school specializations and high technology positions related to neuroscience. The B.S. in Neuroscience will be a multi-disciplinary major, offering training in all aspects of Neuroscience including: cellular neuroscience, neuroanatomy, neurological/psychiatric illnesses and cognitive neuroscience, as well as a foundation in basic life science and psychological sciences related to behavior, learning, and cognition. Students completing this major will gain an understanding of the complexity of the nervous system and the evolutionary conservation of neuronal systems in varying species. Students will also learn how brain structure and function corresponds to the behavior of humans and non-humans. Through the addition of this new program, the Psychology Department will increase its ability to serve its large and diverse student population, to prepare them for careers in new STEM related disciplines, and to enhance and extend the workforce in Hawai’i Island. These objectives will be achieved by creatively repackaging existing resources and course offerings at UH Hilo.

Institutional Context: Mission and Organizational Structure

UH Hilo Strategic Plan. The current UH Hilo Strategic Plan 2011-2015 was approved by the Board of Regents on January 19, 2012. The Bachelor of Science in Neuroscience is consistent with the strategic plan and specifically addresses Goals 1 and 2 (detailed in the following).

Goal 1 of the strategic plan is to “provide learning experiences and support to prepare students to thrive, compete, innovate and lead in their professional and personal lives.” The actions identified by the strategic plan as necessary to achieving this goal include improving our mentorship of students and developing more applied learning settings. The proposed degree in Neuroscience would better enable us to match students who have specific interests in Neuroscience with faculty who have similar interests. This would allow for (1) better mentorship of students; and (2) greater access to research opportunities for those students including summer and post-baccalaureate fellowships.

Goal 2 of the strategic plan is to “inspire excellence in teaching, research and collaboration.” The proposed degree in Neuroscience is an interdisciplinary major, which will serve to provide students with a well-rounded education in the Neurosciences. Forging interdisciplinary collaboration is one of the supporting activities of Goal 2.

Psychology Department Strategic Plan. The proposed B.S. in Neuroscience addresses goals developed and approved by the UH Hilo Psychology Department as a whole. In particular, the B.S. in Neuroscience aligns well with the following goals:

- Advocate for the development and continued support of STEM disciplines to increase the number of competent scientists
• Continue the department’s high standard of student-faculty interaction in research and related activities, which, given the number of neuroscience-focused faculty, is relevant to the mission.

**Organizational Structure.** The UH Hilo Psychology Department is housed within the Social Sciences Division of UH-Hilo’s College of Arts in Sciences. The Psychology Department currently offers undergraduate courses in Psychology, a Bachelor of Arts in Psychology and houses a Master of Arts in Counseling Psychology Program.

**Impact on Current Programs.** The B.S. in Neuroscience will not significantly impact other UH Hilo programs, especially given that the major will be restricted to five students per year. (See admission plan for criteria.) The B.S. in Neuroscience supplements current offerings in the Department of Psychology with courses in the Division of Natural Sciences to create an interdisciplinary program that is comparable to many similar programs elsewhere in the United States (outside of the Hawai‘i/Pan-Pacific region).

The proposed B.S. in Neuroscience is intended to have a positive impact within the Department of Psychology at UH Hilo by providing those students interested in focusing their studies on Neuroscience with a degree in psychology that represents that interest and will better prepare them for graduate and professional programs in neuroscience or related fields in psychobiology, behavior and medicine, health-related technician positions, and health-related high technology positions. The Neuroscience Major is planned as an interdisciplinary program in which along with specific courses in psychology that emphasize neuroscience, biological psychology, and behavior, students will be required to take courses within the natural sciences. No negative impacts are anticipated for either courses in the Department of Psychology, the B.A. in Psychology, or for programs within the natural sciences. On the contrary, this major is expected to increase retention at UH Hilo by offering a program that is unique to the UH system and by offering courses in neuroscience that may be attractive to students in biology wishing to pursue graduate degrees in medicine or pharmacology. In addition, the B.S. in Neuroscience may be attractive to students that begin in a pre-pharmacy or pre-nursing track and are looking for an alternative pathway to obtaining a bachelor’s degree in a health-related field. The course requirements for the B.S. in Neuroscience will be aligned with the course requirements for a B.A. in Psychology. For example, the Core Courses, Block 1 Courses, Block 2 Courses, and Elective Courses currently required for the B.A. in Psychology will also be required for the B.S. in Neuroscience. For the B.A. in Psychology, students have considerable choice in terms of which courses they complete for their Psychology electives. The B.S. in Neuroscience will be more prescriptive as to courses students will need as a part of their electives. However, in the event a student decides to change their major from the B.S. in Neuroscience to the B.A. in Psychology, they will be well positioned to do so because the requirements of both degree programs will be closely aligned. Overall, the B.S. in Neuroscience at UH Hilo will (1) generate new student interest in a cutting edge scientific program not currently offered at an undergraduate academic institution in Hawai‘i; (2) will provide an attractive alternative pathway in a health-related field for undergraduate students competing for limited positions within the colleges of pharmacy and nursing; (3) will provide undergraduate students in psychology with enhanced opportunities to compete for graduate school
positions in cutting edge fields related to the biological aspects of psychology; and (4) will enhance Hawai‘i’s workforce by providing students with skills and knowledge to enable them to better compete for medically-related research and health-care positions.

While the largest number of courses for the proposed Neuroscience Major are supported by the Psychology Department, it is important to note that this major is not possible without the cooperation and participation of the Division of Natural Sciences. During the planning period, the committee was able to meet with and reach preliminary agreements with each of the Natural Science Department Chairs (Biology, Chemistry, Mathematics and Physics), as well as, the Natural Science Division Chair.

The B.S. in Neuroscience will differ from current offerings in a variety of ways, but most notably in the following:

- **Target Student Population.** The B.S. in Neuroscience will target students who are interested specifically in the biological aspects of the mind and behavior as well as the biological/biomedical sciences, in general. This major will be restricted to five students per academic year. Interested students will be required to apply to this program. Students may apply only after they have completed a required number of credits in both Psychology and Biology and have a minimum GPA of 3.0. (See enrollment plan for specific details.) Further, there exists a current population of students who are currently dual-enrolled in both Psychology and Biology as double-majors. However, the double-major cannot be completed in a four-year timeline. Many of these students seek a neuroscience focus which is not currently offered at UH Hilo. Thus, this program will appeal to these students and importantly enable them to complete their degree within four years.

- **Curriculum.** The curriculum for the B.S. in Neuroscience is designed to be rigorous and includes courses from Psychology, Biology, Chemistry, Physics and Mathematics. Upon completion of the program, students will be well positioned for creating competitive applications to a variety of graduate programs in the Neurosciences, Psychology, Medicine, Law, Science Writing, Pharmacy, and Biology. In addition, because the field of mental health is moving toward greater integration of the biopsychosocial model in treatment, this degree will provide a solid foundation in bio-behavioral health for prospective applicants to the Psychology Department’s MA Counseling Program. The B.S. in Neuroscience program is the only one within the State of Hawai‘i that will enable students to attain a solid foundation in all areas of mental health and still allow graduation in four years.

- **Intended Outcomes.** The B.S. in Neuroscience is intended to provide students with a solid foundation in the principles and practice of biomedical science. In addition, as this program requires students to complete the Psychology Major as part of its requirements, students will have the option to continue on in the field of psychology but with the added benefit of expertise in the biological basis of behavior. The implementation of this program, while unique within Hawai‘i,
would reflect the general trend of psychology as an integrative, multi-disciplinary science. As an interdisciplinary program spanning the social and natural sciences, students will receive training in a variety of important skills that will prepare them for a wide range of potential future careers including: graduate school for neuroscience (e.g. the PhD program at UH Manoa), health professions, neuropsychology, clinical psychology, counseling psychology, bioinformatics, psychiatric nursing, science journalism, patent law/technology transfer, and pharmacy.

Program Goals and Objectives

Aims and Goals. The B.S. in Neuroscience aims to provide students with a well-rounded education in brain and behavior that will serve a broad range of applications. While a major path of this program’s graduates would be to pursue graduate education in Neuroscience, this training has broad applications and graduates from existing programs in other states are frequently admitted to a wide-range of post-baccalaureate specializations including medical school. As an interdisciplinary major, B.S. Neuroscience graduates at UH Hilo will be well suited to a variety of careers outfitted with a strong set of analytical skills and practical laboratory experiences.

Mission. The B.S. in Neuroscience Degree advances the Department of Psychology’s mission, to provide its students with the most advanced understanding of behavior and experience. Specifically, the Neuroscience Major will provide students with a substantive understanding of the biological basis of behavior and the knowledge/skills necessary to succeed in this rapidly advancing field.

Objectives. The B.S. in Neuroscience Program outcomes are consistent with those outlined in the Faculty for Undergraduate Neuroscience (FUN) 2012 report: Identifying and Using Core Competencies to Help Design and Assess Undergraduate Neuroscience Curricula (The Journal of Undergraduate Neuroscience Education 11: A27-A37). The objectives outlined in the report are the result of a survey of 203 Undergraduate Neuroscience Faculty from 128 different institutions and represent the skills and knowledge that graduates of the B.S. in Neuroscience at UH Hilo should gain though the completion of this degree.

• Objective 1: Critical Thinking
  o Ability to read and analyze a research paper
  o Ability to critique and develop experimental designs and methodology
  o Ability to integrate findings from diverse fields to address a research question

• Objective 2: Basic Neuroscience Knowledge
  o Understanding neuronal communication at the cellular/molecular level
  o Understanding basic neuroanatomy
  o Understanding of behavior and cognition as they relate to neuroscience
  o Understanding sensory and motor systems as they relate to neuroscience
• **Objective 3: Scientific Inquiry/Research Skills**
  - Ability to develop a hypothesis and design experiments to test this hypothesis
  - Ability to collect, analyze and interpret data

• **Objective 4: Independent Thinker/Self-Motivated Learner**
  - Ability to find answers to questions that may not be addressed directly in a course
  - Ability to develop/defend novel theories using objective evidence
  - Ability to overcome barriers to learning/research

• **Objective 5: Communication Skills**
  - Ability to present information orally in an organized and understandable manner
  - Ability to communicate scientific information in written format for scientific publication
  - Ability to communicate scientific information to the lay public and both oral and written format

• **Objective 6: Quantitative Skills**
  - Ability to analyze and interpret quantitative information including graphs and statistics
  - Ability to quantitatively manipulate data and information
  - Ability to represent information in a quantitative format

**Program Need and Justification**

The UH Hilo Department of Psychology contains one of the largest undergraduate majors at UH Hilo. Consequently, it is vital that this department have offerings that reflect the growth and changes in psychology. The field of Psychology has evolved over the past thirty years to include Neuroscience as a major area of study and aspects of neuroscience are now common in textbooks and course offerings in Learning, Cognitive Psychology, Sensory Perception, and Biopsychology. The dramatic growth in neuroscience as a part of psychology has manifested itself in emphases in new funding opportunities and jobs. Therefore, it is prudent that the UH Hilo Department of Psychology extend and enhance its offerings to undergraduate students by providing them with the opportunity to participate in this thriving new area of psychology, an area that promises broad high level employment opportunities. The opportunity for undergraduate students to specialize their undergraduate studies in neuroscience is a win-win for the students, the community of Hawai`i Island, and the State of Hawai`i in general. Presently, there are no undergraduate degree programs in Neuroscience offered at any University of Hawai`i campus or any private college or university in Hawai`i. Thus, students earning a B.S. in Neuroscience will be in a unique and competitive position for entry into top graduate school or professional programs related to Neuroscience and/or employment in public...
and private sector industries related to Neuroscience. Finally, because of the uniqueness of this program it will serve not only as a “magnet” for new students to UH Hilo, but will showcase UH Hilo as a place of excellence in scientific studies of Neuroscience.

**Anticipated Student Demand**

*Student demand and enrollment projections.*

The UH Hilo Department of Psychology contains one of the largest undergraduate majors at UH Hilo and currently houses approximately 326 students. Given the high student demand for an undergraduate degree in psychology at UH Hilo, it is vital that the Department of Psychology not only offer courses that reflect the growth and changes in psychology, but also opportunities for students to tailor their degree toward areas of psychology that are cutting edge – providing the best prospects for future careers. As a testament to the significant level of student interest in a Neuroscience Degree Program we conducted a survey of UH Hilo Psychology Majors currently enrolled in our Block 2 courses (biologically oriented psychology courses that require as pre-requisites courses in statistics and research methods). The survey of psychology majors consisted of three questions: (1) Would you be interested in learning more about neuroscience? (2) Would you consider majoring in neuroscience if it was offered at UH Hilo? and (3) Are you currently considering a career in neuroscience/biopsychology following your graduation from UH Hilo? The results of the survey, shown in Figure 1 indicate that students are indeed interested in Neuroscience (73% of respondents), that a population of students exists that would consider majoring in Neuroscience (39% of respondents) and that a small but significant percentage of majors (23%) are already considering a career in Neuroscience. These data strongly support the need for this interdisciplinary major, which will better serve those students who are already planning a career in Neuroscience.

![Neuroscience Major Survey Data](image)

**Figure 1: Needs Assessment.** The above data were collected from a survey of students currently enrolled in the Block 2 Courses (Fall 2012) offered by the Psychology Department at UH Hilo.

- ✔ Question 1: Would you be interested in learning more about Neuroscience?
- ✔ Question 2: Would you consider majoring in neuroscience if it was offered at UH Hilo?
Question 3: Are you currently considering a career in neuroscience/biopsychology following your graduation from UH Hilo?

B.S. in Neuroscience Enrollment Projections 2014-2019
On the basis of consistent numbers of students interested in psychology at UH Hilo and the proportion of psychology students interested in the B.S. in Neuroscience Major, the Department of Psychology anticipates admitting up to 5 students in the first cohort, beginning in the fall 2014. The second cohort will admit up to 5 students begin in the fall 2015, with subsequent cohorts admitted annually on this schedule with an anticipated total student enrollment of 15 students reached in Cohort 3. Table 1 shows the anticipated enrollment from 2014-2019.

Table 1. Anticipated student enrollment in the B.S. in Neuroscience from 2014-2019.

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<tbody>
<tr>
<td>Cohort 1 N = 5</td>
<td>Cohort 2 N = 5</td>
<td>Cohort 3 N = 5 Cohort 1 Graduates at year end</td>
<td>Cohort 4 N = 5 Cohort 2 Graduates at year end</td>
<td>Cohort 5 N = 5, Cohort 3 Graduates at year end</td>
</tr>
<tr>
<td>N = 5</td>
<td>N = 10</td>
<td>N = 15</td>
<td>N = 15</td>
<td>N=15</td>
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Relationship to Similar Programs in the UH System and Elsewhere
To our knowledge, there are no Neuroscience Degrees offered at the Bachelor Level in the State of Hawaiʻi, although UH Manoa does currently offer a B.S. Degree in Psychology. We have consulted with Dr. Lorey Takahashi, Chair of the UH Manoa Psychology Undergraduate Program and have attached a letter of support from him (See Appendix F). In terms of graduate programs in Hawaiʻi, UH Manoa offers a multidisciplinary graduate program in Neurosciences as a specialization of the cell and molecular biology graduate program. The proposed UH Hilo undergraduate B.S. in Neuroscience Degree would more than adequately prepare UH Hilo students to be competitive applicants to this program, as well as Neuroscience graduate programs.

As a major at UH-Hilo, a B.S. in Neuroscience will be a unique major in the UH system as well as among other private colleges in the Hawaiian Islands. The Neuroscience
Major will provide an attractive opportunity for UH Hilo students to develop skills and knowledge that will enable them to be more competitive than at present for a variety of graduate programs focused on the biological aspects of psychology (e.g., Neuroscience, Learning, Cognitive Psychology, Cognitive Development, Biopsychology). It will also better prepare them as potential candidates for medical school specializations and high-technology positions related to neuroscience. The B.S. in Neuroscience will be a multi-disciplinary major, offering training in all aspects of Neuroscience including: cellular neuroscience, neuroanatomy, neurological/psychiatric illnesses and cognitive neuroscience, as well as, a foundation in basic life science and psychological sciences related to behavior, learning, and cognition. Students completing this major will gain an understanding of the complexity of the nervous system and the evolutionary conservation of neuronal systems in varying species. Students will also learn how brain structure and function corresponds to the behavior of humans and non-humans. Through the addition of this new program, the Psychology Department hopes to increase its ability to serve an ever growing and diverse student population, to prepare them for careers in new STEM related disciplines, and to enhance and extend the workforce in Hawai‘i Island. These objectives will be achieved by creatively repackaging existing resources and course offerings at UH Hilo.

Program Curriculum and Requirements
The program curriculum for the B.S. in Neuroscience is designed to provide undergraduate students at UH Hilo with a comprehensive background in the field of Neuroscience that is broad enough in scope to cover diverse areas in the field.

The B.S. in Neuroscience Program will be delivered by current faculty within the Department of Psychology at UH Hilo. These include: Dr. Eric Heuer, specialist in Neuroscience and Cognition; Dr. Adam A. Pack, specialist in Animal Learning and Behavior, Marine Mammal Science, Cognition and Cognitive Development; Dr. Errol Yudko, specialist in Neuroscience and Psychopharmacology; Dr. Cassidy Sterling, specialist in Cognitive Neuroscience of Sensation and Perception and Dr. Susan Brown, specialist in Evolutionary Psychology and Neuroendocrine systems. This program can commence with existing courses in Psychology and other departments in the natural sciences as well as current resources. The 2013-2014 UH Hilo course catalog includes 28 courses that would be offered as part of the B.S. in Neuroscience.

Tables 2 and 3 present a listing of required and elective courses respectively in the Department of Psychology and Departments of Biology, Chemistry, Physics and Mathematics within Division of Natural Sciences for the B.S. in Neuroscience Major. These courses already exist in these departments. A total of 82 credits are required for the B.S. in Neuroscience. These requirements as well as other UHH course requirements can be accomplished within four years as a full time undergraduate student. In addition, as the B.S. in Neuroscience requires a substantial number of lower division courses (100-200 level) the graduation requirement of 45 Upper-Division credits will be modified to 34 credits (consistent with the B.S. in Biology for the same reason).
Table 2. List of UH Hilo Psychology Courses for UH Hilo B.S. in Neuroscience Major

<table>
<thead>
<tr>
<th>Type</th>
<th>Required</th>
<th>Number</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>Core</td>
<td>Y</td>
<td>PSY 100</td>
<td>Survey of Psychology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>PSY 213</td>
<td>Statistical Techniques and Lab</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>PSY 214</td>
<td>Research Methods and Lab</td>
<td>4</td>
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<tr>
<td>Block 1</td>
<td>Y</td>
<td>PSY 320</td>
<td>Developmental Psychology</td>
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</tr>
<tr>
<td></td>
<td>Y</td>
<td>PSY 324</td>
<td>Abnormal Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Block 2</td>
<td>Y</td>
<td>PSY 352</td>
<td>Biopsychology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Choose 1</td>
<td>PSY 314,</td>
<td>Learning and Motivation,</td>
<td>3</td>
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<tr>
<td></td>
<td></td>
<td>PSY 315,</td>
<td>Sensation and Perception,</td>
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<tr>
<td></td>
<td></td>
<td>PSY 350</td>
<td>Cognitive Psychology</td>
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<tr>
<td>Block 3</td>
<td>Choose 1</td>
<td>PSY 430,</td>
<td>Physiological Psychology</td>
<td>3</td>
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<tr>
<td></td>
<td></td>
<td>PSY 431</td>
<td>Brain Disease</td>
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<td></td>
<td>Choose 2</td>
<td>PSY 430,</td>
<td>Physiological Psychology</td>
<td>6</td>
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<tr>
<td></td>
<td></td>
<td>PSY 431,</td>
<td>Brain Disease</td>
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<td></td>
<td></td>
<td>PSY 438,</td>
<td>Child Cognition</td>
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<td></td>
<td>PSY 416,</td>
<td>Emotion</td>
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<td></td>
<td></td>
<td>PSY 436</td>
<td>Animal Cognition</td>
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<tr>
<td>Electives</td>
<td>Choose 3</td>
<td>PSY</td>
<td>300 or 400 level</td>
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<tr>
<td>Total</td>
<td></td>
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<td>41</td>
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Table 3. List of UH Hilo Courses in Natural Sciences for the UH Hilo B.S. in Neuroscience Major

| Biology    |  |  |
|------------|  |  |
| Biol 175/175L | Introductory Biology I | 4 |
| Biol 176/176L | Introductory Biology II | 4 |
| Biol 243/243L | Human Anatomy and Physiology I | 4 |
| Biol 244/244L | Human Anatomy and Physiology II | 4 |
| Biol 270/270L | Intermediate Cell and Molecular Biology | 4 |
| Chemistry  |  |  |
| Chem 124/124L | General Chemistry I and Lab | 4 |
### Delivery Formats

The B.S. in Neuroscience will be offered mainly through the traditional campus-based format, but also could include some courses offered online.

**Communication.** A rotating Director of the Neuroscience Major will be designated among the participating faculty within the Psychology Department. The Director of the Neuroscience major will maintain a database of all students accepted into the Neuroscience major in order to support effective communication with students as they progress through the program as well as when they are alumni of the program. Members of the Neuroscience Committee will act as advisors for students in the Neuroscience Major – monitoring each student’s progress through the requirements of the major and counseling students through the admission process.

**Timely interactions.** Interaction between students and the faculty will occur in the classroom, during face-to-face office hours, extra-curricular events, such as PsyChi, and, as opportunities arise, as lab assistants – helping faculty conduct research. Department syllabi provide a timeframe during which faculty will provide feedback on assignments or post grades.

**Learning experiences.** Assignments and learning experiences for online courses will be provided via Laulima, Blackboard Collaborate, Skype, I-Show U, and other appropriate communication media. For example, “Collaborate” captures and stores whole segments of a class for asynchronous viewing and study. Social media allow faculty to duplicate in online environments what occurs in the campus classroom. Courses could incorporate social media, blogs, discussion boards and forums that would allow students to work in small groups and respond to each other online.

**Student expectations.** The same ethics of classroom behavior and responsibility apply across both program formats. To assure that enrolled students complete coursework, syllabi include a standard honor pledge. Laulima also provides a mechanism for this pledge as well as password protected submission of online assignments.
Program Admission and Transfer

Admission requirements. Applicants must demonstrate that they meet minimum qualifications for acceptance to the Neuroscience major, as outlined below:

Grade point average. The applicant must have a GPA of 3.0.

Prerequisite coursework for applicants. Those seeking to apply for the Neuroscience major must have already completed the following prerequisite courses with a final grade in each of C or better.

1. PSYC 100 (3 cr) Survey of Psychology
2. PSYC 213 (4 cr) Statistical Techniques
3. BIO 175 (3 cr) Introduction to Biology I
4. BIO 175L (1 cr) Introduction to Biology I Lab
5. BIO 176 (3 cr) Introduction to Biology II
6. BIO 176L (1 cr) Introduction to Biology II Lab

Personal statement. Each applicant must submit with their application a personal statement that answers the following questions:

1. Why does the applicant wish to obtain a B.S. in Neuroscience?
2. What are the long-term professional and academic goals of the applicant?
3. How will the Neuroscience major help the applicant achieve their long-term goals

Letter of recommendation (One required, submission of a second is optional but encouraged). Applicants must submit recommendation forms aligned to specific professional dispositions and observation of applicant performance in teaching situations as well as academic ability to succeed in graduate coursework.

Admissions Decisions: Admission to the program will be decided by a committee of at least two of the affiliated faculty (one of which being the Program Director). Admission applications will be submitted to the Program Director by January 15 of the application year and applicants will be notified of the decision of the committee by February 15 of that same year.

Transfer of courses/credits. Students must petition to have previously earned credits from other institutions transferred toward their B.S. in Neuroscience degree before applying. Credits petitioned for transfer must be relevant to the B.S. in Neuroscience degree, must have been earned at a regionally accredited university, must not have been used to satisfy the requirements of another degree, and must have been earned in courses
for which the student earned at least a B. Additionally, courses taken more than five years prior to application to the Neuroscience major will not be considered for transfer.

The B.S. in Neuroscience is intended to have a positive impact within the Department of Psychology at UH Hilo by providing those students interested in focusing their studies on Neuroscience with a degree in psychology that represents that interest and will better prepare them for graduate and professional programs in neuroscience or related fields in psychobiology, behavior and medicine, health-related technician positions, and health-related high technology positions. The major is planned as an interdisciplinary program in which along with specific courses in psychology that emphasize neuroscience, biological psychology, and behavior, students will be required to take courses within the natural sciences. No negative impacts are anticipated for either courses in the Department of Psychology, the B.A. in Psychology, or for programs within the natural sciences. On the contrary, this major is expected to increase retention at UH Hilo by offering a program that is unique to the UH system and by offering courses in neuroscience that may be attractive to students in biology wishing to pursue graduate degrees in medicine, scientific studies of the nervous system or pharmacology. In addition, the B.S. in Neuroscience may be attractive to students that begin in a pre-pharmacy or pre-nursing tract and are looking for an alternative pathway to obtaining a bachelor’s degree in a health-related field. The course requirements for the B.S. in Neuroscience will be aligned with the course requirements for a B.A. in Psychology. For example, the Core Courses, Block 1 Courses, Block 2 Courses, and Elective Courses currently required for the B.A. in Psychology will also be required for the B.S. in Neuroscience. For the B.A. in Psychology, students have considerable choice in terms of which courses they complete for their Psychology electives. The B.S. in Neuroscience will be more prescriptive as to courses students will need as a part of their electives. However, in the event that a student decides to change his/her major from the B.S. in Neuroscience to the B.A. in Psychology, they will be well positioned to do so because the requirements of both degree programs will be closely aligned. Overall, the B.S. in Neuroscience at UH Hilo will (1) generate new student interest in a cutting edge scientific program not currently offered at an undergraduate academic institution in Hawai‘i; (2) provide an attractive alternative pathway in a health-related field for undergraduate students competing for limited positions within the colleges of pharmacy and nursing; (3) provide undergraduate students in psychology with enhanced opportunities to compete for graduate school positions in groundbreaking fields related to the biological aspects of psychology; and (4) enhance Hawai‘i’s workforce by providing students with skills and knowledge to enable them to better compete for medically-related research and health-care positions.

It is important to note that while the largest number of courses for the proposed Neuroscience Major are supported by the Psychology Department, this major is not possible without the cooperation and participation of the Division of Natural Sciences. During the planning period, the B.S. in Neuroscience Planning Committee met with and reached agreements with each of the Natural Science Department Chairs (Biology, Chemistry, Mathematics and Physics), as well as, the Natural Science Division Chair. Letters of support provided within the Appendix E of this proposal.
Advising

Members of the B.S. in Neuroscience Major Committee will engage in two forms of advising. The first will involve guiding interested students through the application and admissions process, ensuring eligibility and addressing the requirements for completion of the major. The second form of advising will involve typical interactions between instructors and students in which instructors act as mentors – monitoring the progress of each student, suggesting research and funding opportunities when available, guiding students towards successful post-graduate careers and ensuring a timely progression through the requirements of the major.

Assessment of Student Performance and Program Effectiveness

The faculty affiliated with the B.S. in Neuroscience major have taken careful consideration into assessing the effectiveness of this proposed program. As an interdisciplinary major, the courses and faculty teaching said courses have been and continue to be part of assessment plans in their respective departments. The Psychology Department in particular is in the process of re-evaluating their assessment procedures, in collaboration with the Western Association of Schools and Colleges.

In addition to the assessment conducted by the various departments, the B.S. in Neuroscience Committee has devised the following assessment procedures for the proposed program:

- **Documentation including records of applications, acceptance and attrition**: The Director of the Neuroscience Major will maintain records of student admission from initial advising through major completion.
- **Program Evaluation**: At the end of each calendar year the program faculty will administer a survey to students currently enrolled in the program to obtain opinions on course/program satisfaction and perceived areas of improvement.
- **Survey of Graduates**: Graduates of the B.S. in Neuroscience program will complete an exit survey to gather feedback regarding the quality of the program and the students’ subsequent plans. To the extent possible, the Director will maintain a database of contact information of program alumni in order to follow their career paths.
- **Pre/Post-Testing**: A subject matter exam, designed and administered by program faculty will be required of all majors at the beginning and the completion of their degree to measure knowledge of Neuroscience concepts, principles and practices.
- **Oral Presentation**: Each spring, the prospective graduates will participate in a colloquium and present the results of either an independent study (PSY 394/494) or a literature review written for a 400-level Psychology course.
Resources Required and Resources Available

The proposed program has sufficient resources in terms of faculty, instructional technology, library and student services.

**Faculty.** The proposed B.S. in Neuroscience Major will be taught by three currently tenured faculty (Drs. Yudko, Pack & Brown), one tenure-track faculty (Dr. Heuer) and one instructor (Dr. Sterling); faculty CV’s and qualifications are presented in Appendicies A and B, respectively. All full-time faculty members will contribute to the program in the following areas: curriculum development, instruction, advising, department governance, and service to the department, the university, and the community. In addition, each full-time faculty member must engage in scholarly activities and publish research results.

**Qualifications.** The qualifications of the five faculty involved in the B.S. in Neuroscience Major are presented in Appendix 3. Each full-time faculty member in the program will contribute to the program in the following areas: curriculum development, instruction, advising, department governance, and service to the department, the university, and the community. In addition, each full-time faculty member in the program must engage in scholarly activities and publish research results. Curriculum Vitae for each faculty member in the program are presented in Appendix 4. Collectively, they demonstrate the range of activities in which each full-time faculty is expected engage in.

**Campus and UH System Technology Resources.** Department-specific technology resources are described in the earlier section “Delivery Formats”. In addition, campus and UH system technology resources are also in place. The program is also well supported by campus and UH system technology resources. Through the Office of Campus Technology (OCT), UH Hilo offers a full range of technological services and support for faculty, staff, and students. Externally, the campus has 10 Gigabit communication capacity to the UH system and beyond with Internet 2 capability. The entire campus enjoys excellent communication capacity with fiber connections throughout the campus and campus wide wireless access to the internet. All faculty and most staff have their own office computers, all classrooms have multimedia and internet access, and there are computers available for student use at multiple points around campus. Most faculty, staff and students have 100 Megabit to their desktops, with 1 Gigabit available to research-heavy users. OCT includes the offices of Instructional Technology and User Services, Academic Computing, and Publications. Psychology faculty have access to the UH system's Laulima (Sakai) Learning Management System, and the system’s broad range of instructional technology online resources.

Students also have 24 hour, 7 days a week access to online databases and other informational resources through the University of Hawai`i library, as described in the Library section below. In addition to instructional use of technology, UH Hilo, as part of the UH system, has fully functional administrative and student services computer systems.
to handle a wide range of campus functions. The campus connects with the UH system through the university fiber system and through the state fiber system separately. In addition, all communication systems and servers have Uninterruptible Power Supply to ensure safe power-down if power is disrupted. Scheduled service interruptions are announced in advance and occur after 10:00pm or on weekends.

**Student Services.** Student services are appropriate for and sufficient to meet the needs of students in the proposed B.S. in Neuroscience program. UH Hilo offers the standard array of services to all students. Library resources already serving existing majors are appropriate for and sufficient to serve the Neuroscience major. Mookini Library shares an online catalog with the other UH system libraries, Voyager, which shows print books, some online books, CDs, DVDs, government documents, maps, and course reserves. A separate service, Serials Solutions, lists access to online journal articles and databases, many of which are linked together to make finding information across multiple vendors easier for the patron. Mookini Library has a full-time, tenured Distance Learning Librarian whose duties include ensuring that comparable library services are available for UH Hilo distance learners and faculty. These services include access to library materials (including books, journal articles, A/V, course reserves), reference assistance, and research skills instruction. Instruction is available for both classes and individuals. The Library is committed to improving and maintaining both print and online collections for both books and journals.

Library services for online students include

- Searchable online journal article databases including those required for graduate programs in Education
- Support for information literacy in online courses and programs
- Interlibrary loans of materials are available from other libraries both within the UH system and from mainland libraries (some fees and restrictions may apply).
- Mookini Library is in the process of implementing the ILLiad system for loans of materials to/from libraries outside the UH System.

**Evidence of Commitment for Support.** Table 2 lists courses currently being offered within the Department of Psychology that would continue and be part of the proposed major in Neuroscience. Table 3 lists courses from the natural sciences that would be part of this major. Included in the Appendix E are letters of commitment from chairs of those departments under which those courses are offered, as well as, from the Natural Science Division Chair.
Academic Cost and Revenue Summary

Academic Program
Cost and
Revenues
Template:
Provisional to
Established
(Updated 06/12/12)

ENTER VALUES IN HIGHLIGHTED CELLS
ONLY

<table>
<thead>
<tr>
<th>CAMPUS/Program</th>
<th>University of Hawai’i College of Arts and Sciences/Neuroscience (BS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisional Years (adjust as needed to show all provisional years)</td>
<td>Year 1</td>
</tr>
<tr>
<td>ENTER ACADEMIC YEAR (i.e., 2011-2012)</td>
<td>2014/15</td>
</tr>
<tr>
<td>Students &amp; SSH</td>
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</tr>
<tr>
<td>A. Headcount enrollment (Fall)</td>
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</tr>
<tr>
<td>B. Annual SSH</td>
<td>75</td>
</tr>
<tr>
<td>Direct and Incremental Program Costs Without Fringe</td>
<td></td>
</tr>
<tr>
<td>C. Instructional Cost without Fringe</td>
<td></td>
</tr>
<tr>
<td>C1. Number (FTE) of FT Faculty/Lecturers</td>
<td>$-</td>
</tr>
<tr>
<td>C2. Number (FTE) of PT Lecturers</td>
<td>$-</td>
</tr>
<tr>
<td>D. Other Personnel Costs</td>
<td>$-</td>
</tr>
<tr>
<td>E. Unique Program Costs</td>
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<tr>
<td>F. Total Direct and Incremental Costs</td>
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<tr>
<td>Revenue</td>
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<td>H. Other</td>
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<td>I. Total Revenue</td>
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<tr>
<td>J. Net Cost (Revenue)</td>
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Program Cost per SSH With Fringe

| K. Instructional Cost with Fringe/SSH | | | |
| K1. Total Salary FT Faculty/Lecturers | $1 | $- | $- |
| | $- | $- | $- |
### Cost Including Fringe of K1

<table>
<thead>
<tr>
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<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<tbody>
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<td>K2. Cost Including Fringe of K1</td>
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<tr>
<td>K3. Total Salary PT Lecturers</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K4. Cost Including fringe of K3</td>
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<td></td>
<td></td>
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<tr>
<td>L. Support Cost/SSH Non-Instructional Exp/SSH</td>
<td>$411</td>
<td>$411</td>
<td>$411</td>
<td></td>
<td></td>
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<tr>
<td>System-wide Support/SSH Organized Research/SSH</td>
<td>$369</td>
<td>$369</td>
<td>$369</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. Total Program Cost/SSH N. Total Campus Expenditure/SSH</td>
<td>$411</td>
<td>$411</td>
<td>$411</td>
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### Instruction Cost with Fringe per SSH

<table>
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<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>K. Instructional Cost/SSH</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O. Comparable Cost/SSH Program used for comparison:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Academic Program Cost and Revenues Template:**

**Provisional to Established (Updated 06/12/12)**

**ENTER VALUES IN HIGHLIGHTED CELLS ONLY**

**CAMPUS/Program**

<table>
<thead>
<tr>
<th></th>
<th>Projected Years</th>
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</thead>
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<td></td>
<td>Year 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Students &amp; SSH</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Headcount enrollment (Fall)</td>
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<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
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<tr>
<td>B. Annual SSH</td>
<td>1,050</td>
<td>1,050</td>
<td>1,050</td>
<td>1,050</td>
<td>1,050</td>
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### Direct and Incremental Program Costs Without Fringe

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Instructional Cost <em>without Fringe</em></td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>C1. Number</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

---

1 As the BS in Neuroscience major is an interdisciplinary major, which will be sustained by repackaging existing resources, no new faculty are required for this major at this time.
| (FTE) of FT Faculty/Lecturers | - | - | - | - | - |
| (FTE) of PT Lecturers | - | - | - | - | - |
| D. Other Personnel Costs | $- | $- | $- | $- | $- |
| E. Unique Program Costs | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| F. Total Direct and Incremental Costs | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |

**Revenue**

| G. Tuition | $119,625 | $119,625 | $119,625 | $119,625 | $119,625 |
| Tuition rate per credit | $319 | $319 | $319 | $319 | $319 |
| H. Other | - | - | - | - | - |
| I. Total Revenue | $119,625 | $119,625 | $119,625 | $119,625 | $119,625 |

**J. Net Cost (Revenue)**

| -117,625 | -117,625 | -117,625 | -117,625 | -117,625 |

**Program Cost per SSH With Fringe**

K. Instructional Cost with Fringe/SSH

<p>| 1$- | $- | $- | $- | $- |
| K1. Total Salary FT Faculty/Lecturers | $- | $- | $- | $- | $- |
| K2. Cost Including Fringe of K1 | $- | $- | $- | $- | $- |
| K3. Total Salary PT Lecturers | $- | $- | $- | $- | $- |
| K4. Cost Including fringe of K3 | $- | $- | $- | $- | $- |
| L. Support Cost/SSH | $411 | $411 | $411 | $411 | $411 |
| Non-Instructional Exp/SSH | $369 | $369 | $369 | $369 | $369 |
| System-wide Support/SSH | $42 | $42 | $42 | $42 | $42 |
| Organized Research/SSH | - | - | - | - | - |
| M. Total Program Cost/SSH | $411 | $411 | $411 | $411 | $411 |
| N. Total Campus Expenditure/SSH | - | - | - | - | - |</p>
<table>
<thead>
<tr>
<th>Instruction Cost with Fringe per SSH</th>
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</thead>
<tbody>
<tr>
<td>K. Instructional Cost/SSH</td>
</tr>
<tr>
<td>O. Comparable Cost/SSH</td>
</tr>
</tbody>
</table>

Program used for comparison:

1 At the proposed cap of 5 students admitted per year (total of 15 students across all three years of the major with sophomore admission) no additional instructional resources are necessary. However, any modification to the major caps will require consent of the Psychology Department and contributing Natural Science Departments. In addition instructional resources for Psychology and the contributing Natural Science Departments would need to be provided to accommodate any increase in cohort size.
Explanation of Cost and Revenue Projection

Headcount Enrollment. It is anticipated that 5 students will enroll in the B.S. in Neuroscience Major in Cohort 1, 2015 Spring semester, with additional annual cohorts of five students each year. Given that this program is utilizing a sophomore standing admission progress, the program should not exceed 15 students at any one time (assuming a four year graduation rate).

Annual SSH. With graduation five students should complete the B.S. in Neuroscience degree each year, starting with the Spring of the third program year, 2017.

Provisional Years:

Year 1 = Cohort 1 5 students x 15 cr. = 75 SSH
Year 2 = Cohort 1 5 students x 30 cr. = 150 SSH
Cohort 2 5 students x 15 cr. = 75 SSH
Year 2 TOTAL = 225 SSH
Year 3 = Cohort 1 5 students x 30 cr. = 150 SSH
Cohort 2 5 students x 30 cr. = 150 SSH
Cohort 3 5 students x 15 cr. = 75 SSH
Year 3 TOTAL = 375 SSH

Established Years:

Year 1 = Cohort 2 5 students x 30 cr. = 150 SSH
Cohort 3 5 students x 30 cr. = 150 SSH
Cohort 4 5 students x 15 cr. = 75 SSH
Year 4 TOTAL = 375 SSH
Year 2 = Cohort 3 5 students x 30 cr. = 150 SSH
Cohort 4 5 students x 30 cr. = 150 SSH
Cohort 5 5 students x 15 cr. = 75 SSH
<table>
<thead>
<tr>
<th>Year</th>
<th>Cohort</th>
<th>Enrollment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>5 students x 30 cr.</td>
<td>375 SSH</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5 students x 30 cr.</td>
<td>150 SSH</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5 students x 30 cr.</td>
<td>150 SSH</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>5 students x 15 cr.</td>
<td>75 SSH</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>375 SSH</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>5 students x 30 cr.</td>
<td>150 SSH</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>5 students x 30 cr.</td>
<td>150 SSH</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>5 students x 15 cr.</td>
<td>75 SSH</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>375 SSH</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>5 students x 30 cr.</td>
<td>150 SSH</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>5 students x 30 cr.</td>
<td>150 SSH</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>5 students x 15 cr.</td>
<td>75 SSH</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>375 SSH</td>
</tr>
</tbody>
</table>

**Direct Program Costs**

**Instructional Costs.** At the currently proposed enrollment of five students per cohort, this multidisciplinary program can subsist on existing resources. However, any increase in cohort size would require the approval of the Psychology Department and contributing Natural Science Departments, as well as, critical instructional resources.

**Tuition.** Using DRAFT proposed UH Hilo tuition rates for 2014-2017 via Executive Policy E6.201, March 2013 across the three provisional and first five established years of the program.
Appendix 1: Faculty Curriculum Vitae

BIOGRAPHICAL SKETCH
Provide the following information for the Senior key personnel and other significant contributors in the order listed on Form Page 2.  Follow this format for each person.  
DO NOT EXCEED FOUR PAGES.

NAME: Eric Heuer  
POSITION TITLE: Assistant Professor of Psychology  
AFFILIATION: University of Hawaii at Hilo  
EXPERIENCE: Affiliate Scientist, Yerkes National Primate Center  

EDUCATION/RESEARCH TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

<table>
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<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>DD/MM/YYYY</th>
<th>FIELD OF STUDY</th>
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<tbody>
<tr>
<td>Allegheny College</td>
<td>B.S.</td>
<td>01/2003</td>
<td>Neuroscience and Psychology</td>
</tr>
<tr>
<td>Emory University</td>
<td>Ph.D.</td>
<td>08/2010</td>
<td>Neuroscience (DevelopmentalNeuropsychology)</td>
</tr>
<tr>
<td>Emory University</td>
<td>Post-doc</td>
<td>07/2010-08/2011</td>
<td>Neuroscience (Aging andNeurodegeneration)</td>
</tr>
</tbody>
</table>

A. Personal Statement
My primary research training as a graduate student was the experimental analysis of behavior and brain, in particular nonhuman primate neuropsychology. I employed behavioral tasks to assess working memory and other cognitive processes in developing animals in an attempt to understand how early neural damage could lead to cognitive dysfunction in adulthood. Through this work, I developed an interest in the question of how neural damage affects cognition in life, an issue of pressing social importance in our aging population. At present, there is a critical lack of experimental data on the nature of "normal" cognitive aging, and how to differentiate successful from pathological aging. As a post-doctoral fellow I worked to a diagnostic tool for small vessel disease in the elderly using magnetic resonance imaging. Surprisingly few studies have examined the link between cognitive dysfunction and microangiopathy, particularly cerebral amyloid angiopathy. One reason for this is the paucity of relevant animal models. Thus, this arm of my research plan is to apply my training in neuropsychology and neuroimaging to the study of normal and pathological aging in the brains of aged human and nonhuman primates. In parallel, in collaboration with Dr. Kevin Murmane at Emory University, I am also beginning a study of the long-term effects of stimulant self-administration on the aging brain. The focus of this investigation is to examine non-human primates who have long (>10 year) poly-drug self-administration histories for neurochemical and neurovascular changes.  

B. Positions and Honors

<table>
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<tr>
<th>ACTIVITY/OCCUPATION</th>
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<th>ENDING DATE (DD/MM/YYYY)</th>
<th>FIELD OF STUDY</th>
<th>INSTITUTION/COMPANY</th>
<th>SUPERVISOR/EMPLOYER</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRA Fellow</td>
<td>01/03</td>
<td>07/04</td>
<td>Neuroscience</td>
<td>Laboratory of Neuropsychology, NIMH, NIH</td>
<td>Richard Saunders, DPhil</td>
</tr>
<tr>
<td>Graduate Student</td>
<td>07/2004</td>
<td>07/2010</td>
<td>Neuroscience</td>
<td>Yerkes Primate Center, Emory University</td>
<td>Jocelyne Bachevalier, Ph.D.</td>
</tr>
<tr>
<td>Postdoctoral Fellow</td>
<td>07/2013</td>
<td>08/2011</td>
<td>Aging, Neurodegeneration and Alzheimer's Disease</td>
<td>Walker Laboratory, Yerkes Primate Center, Emory University</td>
<td>Lary Walker, Ph.D.</td>
</tr>
</tbody>
</table>

25
<table>
<thead>
<tr>
<th>Assistant Professor</th>
<th>09/2011</th>
<th>Current</th>
<th>Psychology and Neuroscience</th>
<th>University of Hawaii at Hilo, Yerkes National Primate Research Center</th>
<th>Emory University</th>
</tr>
</thead>
</table>

**Other Experiences and Professional Memberships**

2011- Member, Faculty for Undergraduate Neuroscience (FUN)
2004- Member, Society for Neuroscience (SfN)
2001- Member, Psi Chi Psychology Honor Society

**Honors and Awards**

2008-2010 Interdepartmental Training in Psychopathology and Psychobiology Training Grant Appointment, Emory University
2004-2006 Neuroscience Training Grant Appointment, Emory University

C. Peer-reviewed publications


D. Research Support

**Ongoing Research Support**

Seed Grant, University of Hawaii at Hilo
09/2012-07/2013

The goal of this grant is to develop an invertebrate model of cognitive function and create a brain atlas of the Day octopus (*Octopus cyanea*).
# BIOGRAPHICAL SKETCH

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>YEAR</th>
<th>FIELD OF STUDY</th>
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<td>Brandeis University, Waltham, MA</td>
<td>BA</td>
<td>05/85</td>
<td>Biology (Biopsychology)</td>
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<td>University of Hawaii at Manoa, Honolulu, Hi</td>
<td>MA</td>
<td>05/86</td>
<td>Psychology (Human and Animal Cognition)</td>
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<tr>
<td>University of Hawaii at Manoa, Honolulu, Hi</td>
<td>PhD</td>
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<td>Psychology (Human and Animal Cognition)</td>
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<td>University of Hawaii at Manoa, Honolulu, Hi</td>
<td>Pdoc</td>
<td>06/94-07/08</td>
<td>Marine Mammal Studies</td>
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</tbody>
</table>

## A. Personal Statement

Over the past 25 years, I have conducted laboratory studies of sensory perception, cognitive abilities and communication skills in bottlenose dolphins, and also field research studies on the biology and behavior of North Pacific humpback whales both in the Hawaiian breeding grounds in the Alaskan feeding grounds. I have also conducted field studies of the behavior of spinner dolphins in Hawaiian waters and spotted dolphins in the Bahamas. Topics of study have included: dolphins' cross-modal recognition through echolocation and vision; echolocation discrimination; exploring concepts of same/different; exposing column working memory; imitation skills; understanding pointing and gaze; understanding references to body parts; semantic and syntactic competences; and for humpback whales: migratory timing and residency patterns; long-term patterns in social behavior; the relationship of body size to behavior; acoustic characteristics of male song; characterizing subsurface behavior. These and other studies have resulted in over 50 peer-reviewed journal articles, book chapters and agency reports on dolphins, whales and other marine mammals.

## B. Positions and Honors (listed in chronological order concluding with present)

**Award** Co-recipient: 1998 American Psychological Association Division 63 F.A. Beach Comparative Psychology Award for best paper published in the Journal of Comparative Psychology in 1998 “Seeing through sound: Dolphins (Tursiops truncatus) perceive the spatial structure of objects through echolocation” (Herman, Pack, Hoffman-Kuhnt)

**Associate Editor:** Scientific Journal Marine Mammal Science

**Hawaiian Islands Humpback Whale National Marine Sanctuary Advisory Council**
- Elected Chair and Appointed Research Committee Chair

**The Dolphin Institute (not-for-profit 501(c)(3) organization dedicated to dolphins and whales through research, education and conservation):**
- Co-Founder, Vice President, and Co-Director of Research and Education Program

University of Hawaii at Manoa:
- Affiliate Graduate Faculty, Psychology Department

University of Hawaii at Hilo:
- Associate Professor (Tenured), Psychology and Biology Department
- Faculty Tropical Conservation Biology and Environmental Science Graduate Program
- Teach courses in Statistical Techniques (Psy 213); Learning and Motivation (Psy 314)
- Developed and teach courses in Marine Mammal Behavior (Psy 347); Animal Cognition (Psy 436) and Child Cognition (Psy 438)
C. Selected Peer-reviewed Publications of 44 total (underline = students I have mentored)


D. Research Support: A total of $2,070,385 for marine mammal research and education programs. (** = grant submitted through UH; PI = principal investigator; CPI = co-principal investigator)

Grants Pending or Achieved While at UH Hilo
2013 ($50,000) University of Hawaii Sea Grant College Program. The effects of anthropogenic noise on humpback whale mother-calf pairs (CI) Successful (PI Dr. Whittow Au from HIMB UH Manoa).**
2012 ($258,458) The Harold K. L. Castle Foundation. Community Co-Management at the Department of Land and Natural Resources. A project to build long-term capacity and to develop a process for Community Based Subsistence Fishing Area (CBSFA) designation. (PI)** Successful
2009-2010: ($14,061) University of Hawaii at Hilo Research Council. Investigating the role of dyads and singers in the humpback whale mating system. (PI)** Successful

Grants Achieved Prior to UH Hilo

Whale Research:
2004-2006: ($65,000) National Fish & Wildlife: Whale Conservation Fund (PI)
2004-2006: SPLASH ($54,000) (PI)
2002-2003: ($57,885) Office of Naval Research (PI)
2002-2003: ($20,000) NOAA, Hawaiian Islands Humpback Whale National Marine Sanctuary (CPI)
2002: ($12,000) The Robies Founder (PI)
2001-2002: ($4,440) NOAA, Hawaiian Islands Humpback Whale National Marine Sanctuary (CPI)
2001: ($37,500) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **
2000: ($2,864) NOAA, Hawaiian Islands Humpback Whale National Marine Sanctuary (CPI)
2000: ($32,500) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **
1999: ($43,750) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **
1998: ($38,750) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **
1997: ($31,250) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **
1996: ($48,250) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **
1994: ($27,020) EARTHWATCH Institute “Humpbacks off Hawaii” (CPI) **

**Dolphin Research:**
2000-2009: ($12,125) NOAA PIPIN Grant for wild spinner dolphin research (PI)
2001-2002: ($104,860) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
2000-2001: ($110,360) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
1999-2000: ($142,640) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
1998-1999: ($159,750) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
1997-1998: ($153,360) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
1996-1997: ($157,640) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
1994-1995: ($160,150) EARTHWATCH Institute “Exploring Dolphin Intelligence” (CPI) **
1994: ($300) Sigma Chi Society (PI) $

**Education:**
2000-2007: ($13,000) Ko Olina Training Fund: Grant to provide training experiences to students in marine mammal science (CPI)
2004-2007: ($141,000) Bishop Museum: “Education through Cultural and Historic Organizations” (PI) $
2004-2006: ($395,978) Resort Group of Ko Olina: Grant for development of marine mammal research and education center at Ko Olina, HI (CPI)
2003-2004: ($5,000) The Seto Foundation: Support of marine mammal educational programs of The Dolphin Institute (PI)
2003-2004: ($10,000) The LeBurta Atherton Foundation: Support of marine mammal science outreach programs of The Dolphin Institute

E. Other Accomplishments designed to bring recognition to UH Hilo:

Media presentations of scientific research and other professional endeavors:


Hawaii’s Tomorrow Radio 760 AM (February, 2013). Guest “live” radio interview on recent vessel collisions with humpback whales in Hawaiian waters and issues with Hawaiian monk seals.


Hawaii’s Tomorrow Radio 760 AM (September, 2012). Featured guest on live radio broadcast for program COSFE All Things Marine. Title of show “So you want to know about humpback whales?”

Outside Magazine (September, 2012). Feature story on Dr. Pack’s collaborative research on wild spotted and bottlenose dolphins in the Bahamas with Dr. Denise Herzing of Florida Atlantic University.

The New York Times (September 29, 2011). Comments made on wild spotted dolphin research in Bahamas by colleague and collaborator Dr. Denise Herzing of Florida Atlantic University.

Hawaii Tribune Herald (August 10, 2010). Story on free evening community lecture by Dr. Pack on humpback whale research to be given at NHFRC on September 8, 2010.
National Geographic feature film DVD (spring 2016). Feature Documentary Film “Humpbacks: Inside the Pod.” Film focuses on Dr. Pack’s work in Hawaii on humpback whales using Crittercam. Film aired internationally and credits UH Hilo as Dr. Pack’s institutional affiliation.

National Geographic Television (spring, 2009). Feature Documentary Film “Humpbacks: Inside the Pod.” Film focuses on Dr. Pack’s work in Hawaii on humpback whales using Crittercam. Film aired internationally and credits UH Hilo as Dr. Pack’s institutional affiliation.

Honolulu Advertiser (Feb. 23, 2009). “In whale love, big girls are what’s hot.” Story on Dr. Pack’s latest publication on humpback whales (Pack et al., 2009). Story credit’s UH Hilo as Dr. Pack’s institutional affiliation. Page B5.


New Research Program and Facilities:
- Developed new Marine Mammal Behavior and Biology Research Laboratory on main campus at UH Hilo (PB4-105). Student hires and volunteers from Hilo and abroad (e.g., Australia) assist in the processing and analysis of humpback whale and spinner dolphin data. Equipment to carry out research was provided at no cost to UH Hilo and included: camera equipment, computers, software, the largest data archives of individual humpback whale identification photographs in Hawaii.

Evening Wildlife Lecture Series at NHERC:
- Developed and carried out free evening wildlife lecture series at NHERC from 2010-2011. Lectures were provided on humpback whales by Dr. Adam Pack of Psychology and Biology Department at UH Hilo, on Hawaiian monk seals by Justin Vlieboek of the Hawaiian Islands Humpback Whale National Marine Sanctuary, on Hawaiian spinner dolphins by Susan Rickards of the Hawaii Marine Mammal Consortium, on mushrooms and other fungi of the Hawaiian Islands by Dr. Brian Perry of the Biology Department at UH Hilo, on Hawaiian honeycreeper birds by Dr. Patrick Hart of the Biology Department at UH Hilo, and on disentanglement of humpback whales by Edward Lyman of the Hawaiian Islands Humpback Whale National Marine Sanctuary.
Cassidy Sterling, Ph.D.

EDUCATION


RESEARCH INTEREST

I research the effects of attention on perception with a special interest in understanding the mechanisms underlying voluntary control. This work involves identifying both what attention does and how it does it along with determining the neurological, behavioral and subjective consequences resulting from differences in the ability to control attention.

AWARDS & GRANTS

2011 UC Santa Cruz Outstanding Teaching Assistant Award ($250)
2011 UC Santa Cruz Graduate Student Research Grant ($1,500)
2010 UC Santa Cruz Doctoral Student Sabbatical Fellowship ($9,850)
2010 UC Santa Cruz Graduate Student Research Grant ($1,500)
2010 UC Santa Cruz Psychology Department Travel Grant ($250)
2009 UC Santa Cruz Psychology Department Travel Grant ($305)

PUBLICATIONS


MANUSCRIPTS UNDER REVIEW

CONFERENCE ABSTRACTS / TALKS


OTHER INVITED TALKS


DEPARTMENTAL SERVICE
Served on committee for new faculty hire at UH Hilo 2013
On committee for development of new Neuroscience major in psychology 2013
BIOGRAPHICAL SKETCH

Provide the following information for the Senior Key personnel and other significant contributors in the order listed on Form Page 2
Follow this format for each sensor. DO NOT EXCEED FOUR PAGES.

NAME
Yudko, F, M

POSITION TITLE
Associate Professor of Psychology

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

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<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>VMYY</th>
<th>FIELD OF STUDY</th>
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</thead>
<tbody>
<tr>
<td>University of California, Irvine</td>
<td>B.S.</td>
<td>05/91</td>
<td>Biology</td>
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<tr>
<td>University of Hawai at Manoa</td>
<td>Ph.D.</td>
<td>05/97</td>
<td>Behavioral Neuroscience</td>
</tr>
</tbody>
</table>

A. Personal Statement

My scholarship has focused on five areas: 1) The development of animal models of psychopathology and the use of those models to study the effects of pharmacological agents on aggressive and defensive behavior in both humans and animals; 2) Understanding the relationship between emotionality and substance use in human and non-human animals; 3) Exploring the psychoneuroendocrinology of substance use and abuse in human and non-human animals; 4) Developing and disseminating evidence based models of substance use prevention in adolescents; and 5) measuring the effectiveness of distance learning technologies.

I have broad training in these areas. I received a BA in biological sciences from the University of California at Irvine in 1991, and both MA (1994) and PhD (1997) degrees in behavioral neuroscience from the University of Hawaii at Manoa. My post-doctoral research was spent in the Laboratory of Psychopharmacology at the University of Hawaii at Manoa.

As a student I worked for the Center for Memory and Learning at the University of California Irvine where I studied the neuronal correlates of fear based learning in rodents. At the Boeckeler Laboratory of Neurobiology and the Pacific Biomedical Research Center I expanded my research to include the ethopharmacology of fear, anxiety, defensive behavior, and aggressive behavior. I subsequently worked as a research pharmacologist for the Department of Cognitive Neuroscience for Wyeth Research in the UK developing animal models of cognitive impairments. These endeavors led to numerous publications and conference presentations.

More recently my research has focused on the psychoneuroendocrinology of addiction, the assessment of addiction, substance abuse prevention, and distance education. These interests have led to my being the PI for over $1,000,000 in extra mural funding, publications, conference presentations, and a co-authored book on methamphetamine in 2010.

B. Positions and Honors

Positions and Employment
1990-1991 Research Assistant, University of California Irvine, Center for Memory and Learning
1991-1992 Research Assistant, University of Hawaii at Manoa, Pacific Biomedical Research Center
1994-1997 Fellow, National Institute of Health, Health Psychology
1994-1997 Lecturer, Department of Psychology & CCECS, University of Hawaii at Manoa
1999-2002 Coordinator School Based Services, Big Island Substance Abuse Council
1998-2005 Visiting Assistant Professor, Department of Psychology, University of Hawaii at Hilo
2005-2007 Assistant Professor, Department of Psychology, University of Hawaii at Hilo
2007- Associate Professor, Department of Psychology, University of Hawaii at Hilo

Other Experience and Professional Memberships
1992-2000 Society for Neuroscience, Member
2006-2011 Psi Chi, Faculty Advisor
2010-2011 Association for Psychological Sciences, Member

Honors
2007 Received the Taniguchi Award for Excellence and Innovation
2002 Nominated Chancellor's Award for Excellence in Teaching at the University of Hawaii Hilo.
1994-1997 NIH Research Fellowship in Health Psychology

C. Publications & Presentations

Askren, B., Yudko, E. The Reliability and Validity of a 12 item Questionnaire of Smoking Urge. Association for Psychological Sciences, 2011.


35


D. Research Support

Ongoing Extramural Support

$230,000 Hawaii DOH, ADAD Community-Based Prevention and Intervention Services for Youth, 2012-2014 (Yudko PI)

Completed Extramural Support

$70,000 Court of Hawaii Underage Drinking Prevention, 2011-2012. (Yudko PI)
$70,000 Hawaii DOH, ADAD Community-Based Prevention and Intervention Services for Youth, 2011-2012 (Yudko PI)
$59,750 Court of Hawaii Underage Drinking Prevention 2010-2011. (Yudko PI)
$70,000 Hawaii DOH, ADAD, Community-Based Prevention and Intervention Services for Youth, 2010-2011 (Yudko PI)
$2400.00 Intramural grant for the study of Endocrinology and Addiction, 2008-2009. (Yudko PI)
$750,000 Family and Community Violence Prevention Program. Awarded in 2006-2009. (Yudko PI)
$2183.50 Intramural Grant for study of Endocrinology and Mental Health. Awarded in 2006. (Yudko PI)
$60,000 Grant from the Office of Youth Services to develop a tool to measure likely recidivism rate for adolescent offenders, 2000. (Yudko Co-PI)
Curriculum Vitae

September 24, 2013

Name: Susan G. Brown

Address: Social Sciences Division
           University of Hawai‘i at Hilo
           200 W. Kawili Street
           Hilo, HI 96720-4091

Phone: (808) 974-7374 or 974-7460
Home: (808) 775-8063
Email: susanb@hawaii.edu

Education University of Northern Colorado, 1971-1972

Wichita State University, 1975-1977, B.A.
(Summa cum laude)
Major: Psychology
Minor: Biology

Tulane University, 1978-1981, M.S. Psychology
Masters Thesis: Effects of successive prey presentations on *Nephila clavipes*
spiderlings. Chairman: Terry E. Christenson

Tulane University, 1978-1983, Ph.D. Psychology

Teaching positions

Full professor, Psychology Department, University of Hawai‘i at Hilo August 93-
present. Courses taught: Research Methodology, Statistical Techniques,
Learning & Motivation, Introduction to Psychology, Animal Psychology, History of
Psychology, Physiological Psychology, Evolution of Communication, Social
Development of Primates, Animal Consciousness, Inheritance of Intelligence: Myth
or Reality, Women & Health, Evolutionary Psychology.

Associate professor, Psychology Department, University of Hawai‘i at Hilo, August
Assistant professor, Psychology Department, University of Hawaii at Hilo, August 1885–July 1899.


Instructor, Department of Psychology, Tulane University, January 1983–May 1983. Zo-Biology Behavioral Research.

Research Grants


Territorial and courtship behavior in the Hawaiian hawk, Euteo solitarius. An intramural grant from the University of Hawaii, 12/88-11/89, $5190.00.

The role of social stimulation in egg development and laying in the parthenogenic gecko, Lepidodactylus lugubris. An intramural grant from the University of Hawaii, 10/86-10/87. $4250.00.

Reviewer for

Behaviour
Zoo Biology
International Journal of Comparative Psychology
Patient Preference and Adherence, Dove Medical Press
Therapeutics and Clinical Risk Management
Journal of Happiness Studies
Maturitas
American Malacological Bulletin
Biological invasions
Journal of Zoology
Zoological Studies
Body image
Women and Health

Manuscripts currently under review

Manuscripts in revision:


Publications


Brown, S.G. & Christenson, T.E. (1983). The relationships between web parameters and
Appendix B: Summary of Faculty Qualifications

Eric Heuer, PhD Assistant Professor of Psychology, CAS, UH-Hilo
I received my BS with a double-major in Neuroscience and Psychology from Allegheny College. Subsequently, I worked as a post-baccalaureate fellow in the Laboratory of Neuropsychology at the National Institute of Mental Health, studying the developing rhesus macaque brain using Magnetic Resonance Imaging. Following my NIH Fellowship I pursued my graduate training in Neuroscience at Emory University, studying cognitive development in non-human primates following early brain lesions. Subsequently, I completed a post-doctoral fellowship in age-related proteopathies and Neurodegeneration in Aging before arriving at UH-Hilo in the summer of 2011. In this case, my broad training in neuroscience (focusing from development to aging and from molecular work to behavior) provides an excellent resource from which to teach. Since arriving at UH-Hilo I have taught: Cognitive Psychology, Biopsychology, Research Methods, Measuring the Brain and several other psychology courses. In general, I teach from my neuroscience background, in all courses but have also developed a new course, which examines psychological illness from its biological roots (PSY 431: Brain Disease).

Dr. Sterling, PhD, Instructor in Psychology, CAS, UH-Hilo
My research has focused on the effects of attention on perception with a special interest in understanding the mechanisms underlying voluntary control. This work involves identifying both what attention does and how it does it along with determining the neurological, behavioral and subjective consequences resulting from differences in the ability to control attention. My dissertation determined that the beneficial effects of attention can be allocated more flexibly than previously thought; the area of which is determined in part by the location of distracting information and the requirements of the immediate task. My work has also found that one can selectively attend to information presented in the space perceived inside one’s own head, a finding that has implications for one of the leading theories of attentional control – the premotor theory of attention. Cumulatively, this research provides a broad expertise in the area of neuroscience and provides a unique perspective on the areas of sensation and perception. Furthermore, Dr. Sterling has taught Behavioral Neuroscience classes at the University of California, Santa Cruz as well as an Introduction to Biological Psychology course here, at the University of Hawai´i, Hilo.

Adam A. Pack, PhD Associate Professor of Psychology, CAS, UH-Hilo
I received a BA in Biology with a concentration in Psychobiology from Brandeis University in Massachusetts. In 1988 and 1994, I received respectively an MA and PhD in Psychology with a concentration in Human and Animal Cognition from University of Hawai´i at Manoa. My master’s degree thesis focused on learning and working memory performance in California sea lions, and my doctoral dissertation focused on cross-modal perception in bottlenose dolphins using the senses of echolocation and vision. The latter studies were supported through a grant from the National Science Foundation, and also were recognized by the American Psychological Association with the 1998 APA Division 6’s F.A. Beach Comparative Psychology Award for best paper published in the Journal of Comparative Psychology in 1998: “Seeing through sound: Dolphins (Tursiops
truncatus) perceive the spatial structure of objects through echolocation.” For my post-doctoral work, I served as the Associate Director of the University of Hawai‘i’s Kewalo Basin Marine Mammal Laboratory in Honolulu. There I directed studies of the sensory perception abilities, learning and cognitive skills, and communicative systems of bottlenose dolphins as well as the behavior and communication abilities of North Pacific humpback whales. In 2008, I joined the faculty of UH Hilo. My interests continue to be focused on the cognitive, learning, and behavioral aspects of neuroscience in marine mammals including comparisons with other species. As such, at UH Hilo I have taught traditional courses in learning and motivation and cognitive psychology and have developed three new courses in marine mammal behavior, animal cognition: comparative perspectives, and child cognition.

Dr. Yudko, Associate Professor of Psychology, CAS, UH-Hilo
I have a broad training in the field of Neuroscience. I received a BA in Biological sciences from the University of California at Irvine in 1991 where he worked at the Center for Memory and Learning studying the neuronal correlates of fear based learning in rodents. Following my undergraduate training, I received both MA (1994) and PhD (1997) degrees in Psychology with emphasis in behavioral neuroscience from the University of Hawai‘i at Manoa. During the course of his graduate education I worked at the Bekesy Laboratory of Neurobiology and the Pacific Biomedical Research Center studying the ethopharmacology and psychoneuroendocrinology of fear, anxiety, defensive behavior, and aggressive behavior. Subsequently, I worked as a research pharmacologist for the Department of Cognitive Neuroscience at Wyeth Research in the UK developing animal models of cognitive impairments and completed a post-doctoral fellowship in the Laboratory of Psychopharmacology at the University of Hawai‘i at Manoa. In sum, these experiences have provided me with substantial experience in the field of neuroscience and I have taught courses specifically in area of neuroscience since 1996, including: Psychobiology, Clinical Psychopharmacology, and Drugs of Abuse, health psychology, human sexuality, learning and motivation, and the Psychology of Emotion.
Appendix C: Neuroscience Curriculum Map

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>PSY 410</td>
<td>Foundations of Psychology</td>
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<td>PSY 414</td>
<td>Psychology of Drugs</td>
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<td>PSY 434</td>
<td>Biopsychology</td>
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<td>PSY 435</td>
<td>Introduction to Psychology</td>
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<td>PSY 438</td>
<td>Clinical Psychology</td>
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<td>PSY 439</td>
<td>Cognitive Psychology</td>
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<td>PSY 440</td>
<td>Sensation &amp; Perception</td>
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<td>PSY 441</td>
<td>Learning &amp; Mediation</td>
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<td>PSY 442</td>
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<td>PSY 443</td>
<td>Developmental Psychology</td>
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<td>PSY 100</td>
<td>Survey of Psychology</td>
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Core:
- Communication
- Quantitative
- Critical Thinking
- Neuroscience A's Program Objectives (PO)

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<tr>
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Learning Outcomes:
- Develop a solid foundation in neuroscience
- Demonstrate knowledge of key concepts and theories
- Communicate effectively and accurately in the context of neuroscience
- Apply critical thinking skills to analyze and interpret neuroscience data
- Conduct research in the field of neuroscience
- Engage in lifelong learning in neuroscience
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## Appendix D: Sample 4-Year Graduation Plan

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<td>Psy 430 or Psy 431 or Psy 438 or Psy 416 or Psy 435 or Psy 436</td>
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<tr>
<td></td>
<td>Psy 430 or Psy 431</td>
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<td>Phys 106+170L</td>
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<td></td>
<td>Biol 270 +270L</td>
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<td><strong>Sub-Total</strong></td>
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<td>Hawai‘i Pan-Pacific Integrative Req.</td>
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Appendix E: Letters of Support
1. Social Science Division Chair, Chris Frueh

Dear VCAA Platz,

I am writing at the request of the Psychology Department Neuroscience Major Committee to offer my unequivocal support as the Social Science Division Chair for the Bachelor of Science in Neuroscience Proposal. At a time when fiscal resources are limited, this committee has managed to assemble a cutting-edge multidisciplinary major that builds upon existing resources and strengths, which will increase the available options to our students. I think that this committee should be commended for their work on this project and I offer my unconditional support for this Proposal. Further, the members of this committee have already consulted with the Natural Science Division, demonstrating the feasibility of this major and forging new cross-college collaborations, to the benefit of our students.

In my opinion, and the opinion of many of my colleagues across the US, neuroscience is the future of the discipline of psychology. In fact, as but one example, in my own clinical and epidemiological research on mental illnesses, we are implementing measurements of biological variables relevant to a neuroscience perspective, including genetic sequencing and brain imaging using functional magnetic resonance imaging (fMRI) protocols. We are using these state of the art measures in our psychotherapy clinical trials, examining the effects that psychosocial interventions have on brain structures and circuit activity. The American Psychological Association has an official effort on-going to increase the emphasis of neuroscience approaches in psychology programs across the US, which includes an effort have psychology added to the list of programs meeting STEM eligibility. My strong recommendation is to allow the Psychology Department to add this new major in order to allow it to continue to be a strong, relevant, and state-of-the-art department at UH-Hilo. Without it, the department risks obsolescence and irrelevance.

Please feel free to contact me if you have any further questions. Thank you in advance for your consideration.

Sincerely,

[Signature]

E. Christopher Frueh, Ph.D.
Professor of Psychology
Chair, Social Sciences Division
University of Hawaii, Hilo, HI

Psychology Department

200 W. KAWILI STREET
HILO, HAWAII 96720-4091
http://hilo.hawaii.edu/~psych/

PHONE: 808-933-3198
FAX: 808.974.7737

An Equal Opportunity/ Affirmative Action Institution
2. Natural Science Division Chair, Ernest Kho

Memorandum
October 1, 2013
To: Matthew Platz, VCAA
Via: Randy Hirokawa, Dean, CAS
From: Ernest Kho, Chair Division of Natural Sciences
Subject: Proposal for Neurosciences Major.

I write this memorandum in support of the psychology department's proposal to develop a B.S. degree in neurosciences. I have read the program description in the ATP submitted by Eric Heuer et al. It appears to be academically rigorous, needed, unique in the UH System, and not offered by private institutions in the State of Hawaii. The proposed neurosciences degree will have impact on four departments in Natural Sciences because it requires students to take 11 lower division lecture courses and 10 lower division laboratory courses spread among biology, chemistry, mathematics, and physics. Dr. Heuer has contacted all four departments and they all understand the added pressure the proposed degree will put on some of their lower division courses. Even with the added demand, these departments are still supportive of the proposed neuroscience major.
With the growth of the Natural Sciences major, the lower division courses that are required will also require more instructional resources and operational funding. Hopefully increased resources will follow to support these increases in the departments that offer these required courses.
3. Biology Department Chair, Pat Hart

Sept. 25, 2013

To: Neuroscience Major Committee, UH Hilo Dept. of Psychology (Eric Heuer, Chair)

From: Patrick Hart, Chair, UH Hilo Dept of Biology

Dear Neuroscience Major Committee,

The Department of Biology has reviewed your request for the new Neuroscience major at UH Hilo and is happy to support this proposal. We believe this is an admirable attempt to better serve the needs of students at UH Hilo through expanding the diversity of options they have in choosing a major. In addition, we have reviewed the list of Biology-related courses you plan to require for the new major and feel that your projected 3-5 students per year will not significantly increase the burden on Biology Department resources. We look forward to collaborating with you on this.

Sincerely,

Patrick Hart
Chair, Department of Biology
University of Hawaii at Hilo
200 W. Kawili St.
Hilo HI. 96720
808-974-7645
pjhart@hawaii.edu
4. Chemistry Department Chair, Norbert Furumo

Norbert Furumo <norbiton@gmail.com> 
9:31 AM (2 hours ago) 
Hello Eric,

The Department of Chemistry supports your initiative to establish a B.S. in Neuroscience. Our department can easily accommodate the proposed number of students needing to take chemistry courses for this program. Let me know if I can be of further assistance.

Norbert

Norbert C. Furumo, Ph.D.  
Associate Professor and Chair  
Department of Chemistry  
University of Hawaii at Hilo  
200 W. Kawili St.  
Hilo, HI 96720  
808-974-7318  
nfurumo@hawaii.edu

5. Mathematics Department Chair, Reni Ivanova

Reni Ivanova  
6:27 AM (3 hours ago) 
Dear Eric,

I have reviewed Psychology's BS in Neuroscience Proposal and support their initiative at the currently proposed class size of five students per year, especially considering many of these students are likely already enrolled in Calculus. However, we must acknowledge that, as other UH Hilo departments, we are currently experiencing insufficient faculty resources.

Good luck to the Program!
To whom it may concern:

I am writing this letter at the request of the Neuroscience Proposal Committee in the Department of Psychology at UH Hilo. The committee contacted me to request course support for their proposed interdisciplinary major in Neuroscience, which would require students to take College Physics I and II, including the laboratory sections. As chair of the Physics Department at UH Hilo, I am supportive of this new initiative, which will provide students with increased options by repackaging existing resources. Please contact me if you have any further questions.

Sincerely,

[Signature]

Philippe Binder
Professor and Chair
Appendix F: Letter of Support from UH Manoa

September 26, 2013

Dwain Contest, Ph.D.
Chair, Psychology Department
University of Hawaii Hilo
Hilo, Hawaii 96720

Dear Dr. Contest,

I am very pleased to recommend your proposal for a Neuroscience B.S. degree at the University of Hawaii at Hilo. The Neuroscience field is a dynamic one that has expanded tremendously in the last 40 years. As an example, over 30,000 participants now attend the Annual Society for Neuroscience meeting. This has taken our undergraduates to this meeting and they were astonished at the range of research from gene to behavior presented by investigators from institutions throughout the world. Exposing our undergraduates to STEM-related neuroscience courses will prepare them for advanced degree training in neurosciences as well as in medicine and pharmacology. Students majoring in Neuroscience will also be exposed to a range of STEM-related courses that may lead to other STEM Field careers, which are considered to have a key role in stimulating job growth with high wages in the U.S. economy.

In summary, I enthusiastically recommend your B.S. degree proposal in Neuroscience at the University of Hawaii at Hilo. Students majoring in Neuroscience will obtain tremendous, lasting value from their undergraduate education.

Yours sincerely,

Lovy E. Fukunishi, Ph.D.
Professor of Psychology &
Psychology Undergraduate Chair &
Director, Psychology Honors Program