Proposal for a
SCHOOL OF NEUROSCIENCE
at The University of Arizona

Contact:  Julie Barkmeier-Kraemer, PhD
           Assoc. Professor
           Speech, Language, and Hearing Sciences
           jbark@u.arizona.edu
           work (520) 621-5699
           fax (520) 621-9901

Neuroscience Committee Members:

**Faculty:**

- **Julie Barkmeier-Kraemer, PhD**, CCC-SLP
  Associate Professor
  Speech, Language, and Hearing Sciences
  GIDP in Neuroscience
  BIO5 Collaborative Research Inst

- **Jean-Marc Fellous, PhD**
  Associate Professor, Psychology, Member of Neuroscience,
  Applied Mathematics, and Cognitive Science Programs,
  the Division of Neural Systems, Memory, and Aging, and
  Evelyn F. McKnight Brain Institute, Representative
  for the Society for Neuroscience Tucson Chapter

- **Linda Restifo, MD, PhD**
  Professor, ARL Division of Neurobiology, Department of
  Neurology, BIO5 Collaborative Research Inst
  Evelyn F. McKnight Brain Inst
  Dept. of Cell Biology & Anatomy, Member of Neuroscience,
  Genetics, Cognitive Science, and Insect Science GIDPs

- **Thomas Christensen, PhD**
  Senior Research Scientist
  Speech, Language & Hearing Sciences
  Member, Advanced Research Institute for Biomedical Imaging
  Member, Cognition & Neuroimaging Laboratories

- **Richard Levine, PhD**
  Professor
  ARL Division of Neurobiology
  Department of Physiology
  Member of Physiological Sciences and Neuroscience GIDPs

- **Lynne Oland, MSN, PhD**
  Research Scientist
  ARL Division of Neurobiology
  Member of Center for Insect Science
  Past President of the Arc of Tucson
  Citizen Advisory Board for the University Center for Excellence
  In Development Disabilities

**Students:**

- **Ms. Penny Dacks, BScH in Life Sciences**
  Graduate Program in Neuroscience

- **Ms. Robin Samlan, M.S.**
  Speech, Language, and Hearing Sciences

- **Ms. Emily Foreman, B.A.**
  Audiology Clinical Doctorate Program

**Community Representatives:**

- **Hughlett Morris, PhD, CCC-SLP**
  Professor Emeritus, University of Iowa
  Previous Director of the Division of Speech Pathology
  and Audiology in the Dept of Otolaryngology – Head
  and Neck Surgery, Univ. of Iowa Hospitals and
  Clinics, PI of 30-yr grant supporting Multi-disciplinary Research on Etiology and Treatment of Craniofacial Anomalies

- **Judy L. Huch, AuD**
  Oro Valley Audiology, Inc
  Tanque Verde Audiology, Inc

- **Sarah Super Ascher, M.S., CCC-A**
  Clinical Coordinator
  Balance, Audiology, and Neuro Rehab Programs
  Carondelet St Joseph’s Hospital Programs
  Out-Patient Rehabilitation Services

- **Sharon Hesterlee, Ph.D.**
  VP Translational Research
  Muscular Dystrophy Association

- **David Parry, M.D.**
  Pediatric Otolaryngologist with expertise in Cochlear
  Implants
  Tucson Ear, Nose, & Throat (TENT)

- **Fabiane M. Hirsch, Ph.D., CCC-SLP**
  Program Lead
  Carondelet Aphasia Program
  Carondelet St Joseph’s Hospital

- **John Gray, M.D.**
  Pediatric Neurology Associates
  Tucson, AZ

**Units Affected by Reorganization:**
ARL Div. of Neural Systems, Memory & Aging (NSMA); ARL Div. of Neurobiology (ARLDN); Dept. of Psychology (Currently in the College of Social & Behavioral Sciences); Dept. of Speech, Language & Hearing Sciences (College of Science)
This white paper proposes establishing a School of Neuroscience, a new unit within the College of Science that would serve as an umbrella organization for neuroscience faculty from the Departments of Psychology, Speech, Language, & Hearing Sciences, and consolidation of smaller existing units (NSMA and ARLDN) to form a NEW Department of Molecular, Cellular & Systems Neuroscience. Our committee, consisting of faculty, students, and staff from neuroscience units across the campus, as well as civic leaders and patient advocates from the Tucson community, is unanimous in proposing consolidation of key units of the Neuroscience Community to:

- Use existing resources to create a new academic and administrative structure for the study of the neurosciences at both undergraduate and graduate levels,
- Strengthen interdisciplinary research collaborations from basic to clinical research in neuroscience,
- Strengthen ties to community and state neuroscience resources (e.g. Carondelet Neurological Institute, Barrow Neurological Institute, Mayo Clinic in Scottsdale, Muscular dystrophy association, Flinn Foundation, Muscular Dystrophy Association, Tucson Alliance for Autism, Parkinson Disease Association, Arizona Alzheimer's Consortium, etc),
- Expand current outreach educational, clinical, and research activities to the community through activities aimed at educating the public about brain science and brain health (e.g. Brain Awareness Week, Junior Scientist Kids Day, NSSLHA Educational Forum, etc), and
- Eventually evolve toward an integrated model of training and research across academic and clinical resources to receive private and federal funding for an ABOR-approved UA Neuroscience Center.

The proposed School of Neuroscience will serve as the coordinating structure for the existing GIDP in Neuroscience and a cooperative undergraduate major/minor in neuroscience using existing coursework across collaborating departments. Further, this School will share joint appointments from other departments within the Colleges of Science, Engineering, and Medicine with overlapping neuroscience interests to contribute to the research mission. A unique feature of our proposal is to establish community and state partnerships with clinical research and training sites for our undergraduate and graduate neuroscience students at such locations as the Carondelet Neurological Institute, Barrow Neurological Institute, and Mayo Clinic in Scottsdale. The highly interdisciplinary and translational science structure of the School is expected to attract increased research funding, greater recruitment of world-class scientists, and greater student enrollment to the UA. As the School of Neuroscience grows in reputation and importance to patient populations, we expect that it will attract substantial private and federal funding as it meets NIH and NSF priorities for interdisciplinary research, integration of research and clinical experiences into academic programs, and bridging basic to applied research within the neurosciences. Ultimately, our extended vision is to seek ABOR approval for a nationally and internationally recognized UA Neuroscience Center that would serve as the home and focal point for neuroscience research on campus.

1. Explain how the reorganization or consolidation will strengthen the unit’s teaching, service, and research, or creative activities...

Understanding normal and abnormal function of the nervous system across the human lifespan is currently one of the most critical research and educational priorities of our time. Studies at the National Institute of Neurological Disorders and Stroke (NINDS) at the National Institutes of Health recently reported that neurological disorders, including multiple sclerosis, Alzheimer's disease, strokes, Parkinson's disease, autism, and cerebral palsy, are more prevalent in the US and worldwide than they were in 1982. Given the impact of these disorders, the UA neuroscience community believes that it is imperative that we (i) enhance basic neuroscience research; (ii) uncover the root causes of neurological disorders; and (iii) develop safe and effective prevention, diagnostic, and treatment strategies for them. The University of Arizona’s 2009-2013 Strategic Plan to "put people first" identified biosciences and...
biotechnology, and biomedical and behavioral health as two directions of priority that are critical to our society's future. Through consolidation of existing units into a new School of Neuroscience, we will achieve administrative efficiencies, as well as forge the development of a world-class research and teaching enterprise that will synergize existing areas of strength in neuroscience research and clinical care. There are important motivations for this consolidation. First, a new undergraduate neuroscience major/minor program will help contribute directly to the recruitment pool for our existing Neuroscience GIDP. An increase in the number of neuroscience graduates from the UA will have a strongly positive impact on the quality of care and services that are currently directed at individuals across our state, our nation, and our world who suffer from neurological disorders and diseases. Together, our research, clinical, and scholarly activities will be directed toward improving the human condition in Arizona and beyond.

Our proposal will address the priorities identified in the UA Strategic Plan by consolidating key components of the current Neuroscience Community into a School of Neuroscience that will provide a more efficient and unified structure to its educational curriculum and research priorities than is currently in place. Current duplication in course offerings and administrative structure would be eliminated under this proposal. At the same time, existing research collaborations would be more readily expanded, and numerous collaborations that are already in place provide tangible evidence for cooperation and shared missions among our faculty, students and staff. Thus, the existing GIDP in Neuroscience would be significantly enhanced.

Based on an investigation of other graduate programs in neuroscience across the US, 20% of current graduate students have an undergraduate degree in neuroscience. In addition, multiple recent surveys of UA undergraduate students revealed strong interest in a neuroscience major and/or minor. We propose offering an undergraduate neuroscience major and minor curriculum that was developed as part of an ARLDN effort to build a major/minor in neuroscience composed largely of existing UA courses. Thus, the proposed new undergraduate neuroscience program will not require new resources. The UA is one of the few major research universities in the US that do not offer such a program. We propose to introduce a minor in Neuroscience first, followed by a full major degree program in the near future. The curriculum proposal includes interdisciplinary coursework, research and lab rotations, and unique research and clinical experience placements utilizing our community and state partners such as the Carondelet Neurological Institute, Barrow Neurological Institute, and Mayo Clinic in Scottsdale. Under our proposal, more UA students would develop an interest in neuroscience as undergraduates and would be stimulated to consider advanced training in neuroscience. This will enhance the applicant pool for our graduate program and facilitate its rise in national and international standing. In addition, the undergraduate degree in neuroscience would offer an alternative major for pre-med students. This option would promote recruitment of future medical doctors to contribute to current needs in research and service delivery to those suffering from neurological diseases and injury. Finally, we know of NO OTHER undergraduate degree program that offers a true integration of basic research to clinical placement. Thus, such a unique “out of the box” program directly addresses the priorities of the NIH and NSF roadmaps for interdisciplinary training programs.

Research and teaching missions of the proposed 3 departments affiliated with the School of Neuroscience will be enhanced by existing research interactions that have developed among faculty on the main campus and in the COM. In particular, imaging, genetics and computational neuroscience, three approaches that are currently driving major advances in neuroscience, are already promoting interactions at UA, which could be enhanced under the proposed plan by offering joint appointments to faculty in other departments. Several of these faculty members already hold joint appointments (e.g. ECE and MCB). In addition, significant expertise in neurophysiology and neuropharmacology also exists within the UA COM. Although it is not practical to propose transferring faculty or merging COM and main campus departments at this time, joint appointments will be offered to key faculty members, several of whom are already involved in research collaborations, as well as graduate and undergraduate teaching (PSIO) in courses that may serve as electives for neuroscience majors. This strong faculty base will maintain current areas of strength and provide a focus for strategic hires in an area where the UA
has an opportunity to become a world leader, as in computational neuroscience, pain research, and aging.

The most crucial health-related issues in neuroscience require interdisciplinary collaboration. The School of Neuroscience, through its leadership in basic and clinical biomedical research and training, will lead a strongly collaborative effort toward a more thorough understanding of the biological basis for neurological disorders and diseases. Existing basic research foci in cognitive neuroscience, molecular neuroscience, genetics, cellular neurophysiology, computational neuroscience, and imaging will drive advances in medical research through the enhanced interaction that the proposed structure would promote.

2. How this consolidation will raise the unit’s and the University’s ranking or reputation
The UA School of Neuroscience would lead to an increased number of students and would draw top-tier leaders in neuroscience. The proposed School of Neuroscience model of interdisciplinary education, training, and research will help prepare students from the UA for clinical and basic research that translate to uncovering the mechanisms underlying neurological disorders and to progress in their treatment. This model will draw national and international recognition for its innovation and unique response to community, state and national needs in neuroscience research and clinical training.

The proposed new structure would also facilitate our goal to develop a world-class UA Neuroscience Center that will serve as a focal point for neuroscience research and training across the campus and be linked strongly with clinical enterprises locally and throughout the state of Arizona. The UA Neuroscience Center would not only house the labs, clinics, and shared facilities necessary to conduct the research and to serve our patient populations, but it would provide a centralized hub for campus-wide neuroscience activities. The eventual UA Neuroscience Center will be competitive for awards like the new NIH Clinical and Translational Science Awards (CTSAs). In addition, enthusiastic input from our community representatives indicates that it will attract other financial sponsors from the local community and the state of Arizona.

3. Describe the processes of consultation with deans, heads, faculty, staff, appointed personnel, and student and the extent to which this proposal has the support of those affected.
Faculty, students, and staff associated with affected Department units, as well as community representatives were invited to participate on the committee. The department heads of the SLHS, Psychology, Physiology, Applied Mathematics, and Cellular Biology and Anatomy departments and faculty from the Dept of SLHS and the ARL Divisions of Neural Systems, Memory and Aging and Neurobiology received a copy of proposal drafts and were contacted by their assigned representative on this committee for feedback. The Deans of the Colleges of SBS and the COS received a copy of this proposal and were invited to respond with feedback. Dean Ruiz distributed this proposal to College of Science classified staff and appointed professionals. Students from the GIDP in Neuroscience and SLHS participated on the committee or provided feedback on the proposal. Some of the undergraduates from the Dept of Psychology and SLHS were surveyed regarding their interest in an undergraduate neuroscience major/minor. Dr. Lynne Oland (ARLDN) contributed to the undergraduate major/minor curriculum in neuroscience. Dr. Elena Plante (Dept Head for SLHS and committee member of the Mind, Brain, and Behavior (MBB) committee) indicated support for the similar programmatic and administrative reorganization described in this proposal and the MBB proposal. Dr. Michael Tabor (Dept Head for the Applied Mathematics Program) supports this proposal. Dr. Betty Glisky (acting Dept Head for Psychology) conveyed concern about the Dept of Psychology being located within a School of Neuroscience, but supported a collaborative association. An informal poll of several faculty members in Psychology indicated that about half of the Psychology faculty was supportive of this proposal. All community representatives were included in the process of writing the current proposal through electronic communication as well as the opportunity to participate in a meeting on campus to provide comments and suggestions on the proposal as did SLHS administrative and clinical staff who were not committee members.
BUDGET CONSIDERATIONS

• THIS IS A BUDGET NEUTRAL PROPOSAL as existing resources will be used to create a new academic and administrative structure for the study of the neurosciences at both undergraduate and graduate levels.

• ADMINISTRATIVE AND INSTRUCTIONAL COST SAVINGS MAY BE ACHIEVED BY THE consolidation of smaller units into a new department (Molecular, Cellular & Systems Neuroscience) and by reducing several small department-specific courses with overlapping content.

• ADMINISTRATIVE COST SAVINGS MAY BE ACHIEVED AS THIS SCHOOL DOES NOT REQUIRE APPOINTMENT OF A DIRECTOR. RATHER, THE SCHOOL OF NEUROSCIENCE WILL BE ADMINISTERED BY A STEERING COMMITTEE consisting of the Department Heads of Psychology, Speech, Language & Hearing Sciences (SLHS), and Molecular, Cellular & Systems Neuroscience (MCSN).

• Initially, it is anticipated that creating a neuroscience major/minor would recruit students from our current undergraduate student body. This would not initially result in revenue generation. However, we anticipate that the unique interdisciplinary qualities of the proposed world-class neuroscience program would attract more of the brightest and best students from across the U.S. and other countries. This would lead to increased numbers of students drawn to the UA School of Neuroscience resulting in increased revenue.

• We anticipate increased levels of private and federal funding to support cutting edge and high priority neuroscience research. The eventual UA Neuroscience Center will be competitive for awards like the new NIH Clinical and Translational Science Awards (CTSAs). These grants are five-year awards that average approximately $10 million/year.

• We anticipate the proposed School of Neuroscience and UA Neuroscience Center will attract generous donations from business and patient communities in the local community and across the state of Arizona.

• The Carondelet Neurological Institute is poised to become the "Barrow" of southern Arizona (see article from the Star over the weekend http://www.azstarnet.com/allheadlines/260715.php). Partnering with this local resource and others identified previously (i.e. Barrow Neurological Institute, Mayo Clinic in Scottsdale) for clinical research and training would tap into opportunities not currently utilized by our university for both undergraduate and graduate students. We anticipate financial gains through this partnership that will benefit neuroscience research, clinical training, and patient care priorities. This is already occurring through UA student training within the recently established Balance Center at the Carondelet Neurological Institute attracting $100,000 of support from the Carondelet Foundation.

• The community and state neurological and neuroscience focus follows current national trends in neurological approaches to health care. Currently, the model of health care has moved from individual departments toward interdisciplinary team approaches. The proposed School of Neuroscience model of interdisciplinary education, training, and research will help prepare students from the UA for this future healthcare model as well as clinical and basic research that translate to patient diseases and their treatment. This model will draw national and international recognition for its innovation and unique response to community, state, and national needs in neuroscience research and clinical training.