2016 CALL FOR RESEARCH PROPOSALS

SYNOPSIS

We invite proposals for innovative, interdisciplinary research projects that will generate new insights in the science of learning. The Institute supports research at all levels of scientific inquiry, from changes at the level of synapses to the nature of cognitive change over the life-span, connections between these and technological innovations, and the implications of these for education and learning in formal and informal settings. The grant program is open to full-time faculty members of JHU. Applications are due March 21, 2016 at 11:59 EST.

I. INTRODUCTION

The mission of the Science of Learning Institute (SLI) is to understand and optimize the most essential part of our human capital: the ability to learn. Learning is a complex process that spans biological, psychological, sociological, and technological systems. There is growing recognition that we must create synergies across disciplines to truly unlock the complexities of learning and optimize learning for all. To this end, the goal of the SLI’s grant program is to generate innovative scientific discoveries about lifelong learning through interdisciplinary collaborations that span within and across the basic and applied sciences at Johns Hopkins University. We seek to create an integrated understanding of the cellular and molecular mechanisms of learning, how learning varies as a function of basic learner characteristics (e.g. under genetic change, over the life span, across individual differences), how these characteristics interact with different environments to produce variation in learning outcomes, and how interactions with intelligent artificial learning systems can enhance and optimize human learning.

This call invites proposals for research that will draw upon the existing expertise of Johns Hopkins faculty to direct innovative, interdisciplinary research projects. Previously funded projects have integrated theories and methods from neuroscience, cognitive science, computer science, psychology, robotics, biomedical engineering, rehabilitation, and education. Please see Section VI of this call to view a full list of funded projects and read one-page project descriptions on our website. For more information about the Institute’s mission and goals, please see: http://scienceoflearning.jhu.edu.

II. ELIGIBILITY AND AWARD INFORMATION

We invite proposals on the science of learning for funding of up to $200,000 over 2 years. Principal Investigators (PIs) and Co-PIs must be full-time faculty members at JHU who are eligible to serve as PIs/Co-PIs in their division. Faculty from any division within the University are eligible to apply. Divisions include Krieger School of Arts and Sciences, Whiting School of Engineering, Carey Business School, School of Education, School of Medicine, School of Nursing, Peabody Institute, Bloomberg School of Public Health, and School of Advanced International Studies (for more information about JHU schools, see https://www.jhu.edu/academics/). The PIs and Co-PIs must be from (a) at least two different disciplines and (b) two departments or divisions from Johns Hopkins University. We especially welcome proposals that include PIs and Co-PIs who are in the early stages of their careers. Priority will be given to those who have not received funding during the previous grant cycles.

Please note that applications will be returned without review if:

1. The applicants do not meet the stated eligibility requirements above.
2. The research project does not align with the mission of the Science of Learning Institute.
3. The application does not adhere to the formatting guidelines or include all relevant application materials (described in Section IV, below).

III. APPLICATION REVIEW CRITERIA

Priority will be given to proposals that are strongest in meeting the following criteria, which will be explicitly evaluated in the review process:

1. **Innovation:** The project seeks to discover principles about learning that break traditional barriers and generate truly new insights.
2. **Interdisciplinarity:** The project uses multiple theoretical and empirical approaches to the same learning problem, and clearly draws on expertise spanning more than one discipline, department, and/or division in the University.
3. **Sustainability:** The project is likely to generate preliminary data that could be used to generate continuing support for the research, including grant proposals to federal institutions, private foundations, and/or industrial partners when the grant period is complete.
4. **Approach:** The project’s design, methods, and analytic plan are well-developed, integrated, and appropriate to the aims of the proposed project and the research environment.
5. **Strength of PI and Research Team:** The PI has a demonstrated ability to carry out and publish high quality research, and team members are uniquely qualified to create new synergies across traditional disciplines with appropriate content knowledge and methodological expertise to carry out all elements of the proposed project, including dissemination of research to appropriate target audiences.

IV. APPLICATION PREPARATION AND SUBMISSION

A. Formatting Requirements
All application materials must be formatted to fit on 8.5 x 11” paper with 1-inch margins, single line spacing, 12-point Times New Roman font, and consistent with the professional style guidelines of the applicant’s field. Please adhere to the specified page limit for each section (listed in parentheses below). Applications will be returned without review if formatting guidelines are not followed.

B. Proposal Materials
Proposals should include the following items:
1. **Project Abstract:** A short description of the project in 300 words or less.
2. **Project Description (9 pages maximum):** This document must contain the following sections:
   a. **Background and Specific Aims (2 pages):** This section should clearly describe the background, the objectives of the project, and the hypotheses or questions addressed. This section should end with a numbered list of the Aims.
   b. **Approach (3 pages):** This section should clearly describe the research design, measures, data analysis plan, and any preliminary data.
   c. **Significance (1 page):** This section should include 3 clearly-labeled subsections that briefly describe how the project addresses the innovation, interdisciplinarity, and sustainability evaluation criteria listed above. This section should clearly demonstrate the importance of the project or describe the critical barrier to progress in the science of learning domain and how the project will improve scientific knowledge, technical capability, and/or practice if the aims are achieved.
   d. **Project Timeline for Years 1 and 2 (1 page):** This section should include a brief project timeline (table format preferred) that identifies major project activities and their projected completion dates (e.g., experiment development, research trials, data analysis, manuscript submission).
3. **Budget and Budget Justification for Years 1 and 2 (1-2 pages):** This section should include personnel effort (PI, Co-PI, other key personnel), salary, equipment/materials/supplies, travel expenses, and other categories, as needed. Faculty salary can be included but funding for this will not exceed 15% effort for each PI/Co-PI. Indirect costs are not covered by SLI grants.

4. **Brief Biographical Sketches of PI, Co-PI(s), and other Key Personnel:** Complete a brief, 2-page statement summarizing each individual’s qualifications for the proposed project as well as a list of their existing funding for research related to the project. Please download the biographical sketch template and instructions.

C. **Application Deadline and Timeline for Review**

Applications are due 11:59pm EST on March 21, 2016, and should be submitted via the Science of Learning Institute’s grant application and review website (a link to the grant application site will be listed on the SLI’s website). The site will open for submissions starting October 15, 2015. Evaluation of proposals will be carried out by a team of internal evaluators who are experts in the science of learning. Funding is expected to start on July 1, 2016. Funding after Year 1 will be contingent on acceptable progress as described in a progress report due two months prior to the start of Year 2.

D. **Fast Facts: Science of Learning Institute Grant Funding in 2013, 2014, and 2015**

- 64 research proposals were submitted and 20 were awarded grants.
- Average grantee award for 2-year projects was $144,250.
- View round 1 and 2 funded project summaries on our website.

V. **QUESTIONS**

Applicants who wish to discuss their project before applying are encouraged to contact SLI personnel or members of the steering committee with the most relevant expertise. Questions about the application process or review timeline should be directed to Mike Alexander, SLI Program Coordinator, malexander@jhu.edu.

**SLI Staff & Steering Committee**

**Personnel**
- Barbara Landau, Director, Science of Learning Institute; Professor, Cognitive Science, landau@jhu.edu
- Kelly Fisher, Associate Director, Science of Learning Institute; Assistant Professor, School of Education, kelly.fisher@jhu.edu
- Kristin Gagnier, Outreach and Evaluation Specialist, Science of Learning Institute; Assistant Research Scientist, Cognitive Science, kristin.gagnier@jhu.edu

**Steering Committee**
- Randal Burns, Professor, Computer Science, randal@cs.jhu.edu
- Mark Chevillet, Program Manager, Applied Physics Laboratory, mark.chevillet@jhuapl.edu
- Charles E. Connor, Professor, Neuroscience, connor@jhu.edu
- Barry Gordon, Professor, Cognitive Neurology/Neuropsychology, bgordon@jhmi.edu
- Richard Huganir, Professor and Director, Neuroscience, rhuganir@jhmi.edu
- Patricia Janak, Professor, Psychology and Brain Sciences, patricia.janak@jhu.edu
- Sanjeev Khudapur, Associate Professor, Electrical and Computer Engineering, khudapur@jhu.edu
VI. PREVIOUSLY FUNDED PROJECTS

Previously Funded Grants Include Investigators From:
- Bloomberg School of Public Health (e.g., Biostatistics; Population, Family, and Reproductive Health; Mental Health)
- Krieger School of Arts and Sciences (e.g., Biology, Psychological and Brain Sciences, Cognitive Science)
- School of Education
- School of Medicine (e.g., Biomedical Engineering, Neurology, Neuropsychology, Neuroscience, Otolaryngology, Pediatric and Adolescent Medicine, Physical Medicine and Rehabilitation, Psychiatry and Behavioral Science, Radiology, Surgery)
- Whiting School of Engineering (e.g., Computer Science, Electrical and Computer Engineering, Mechanical Engineering, Applied Mathematics and Statistics)

Previously Awarded Grant Project Titles (Investigators):
- Spatial Localization Through Learning: An Information Theoretic Approach (Jonathan Flombaum, Bruno Jedynak, Lisa Feigenson)
- Cognitive, Neural and Translational Implications of a New Reading Disorder (Michael McCloskey, Brenda Rapp, Gregory Hager, Mariale Hardiman, Argyle Hillis, Kerry Ledoux)
- The Role of Astrocytes in Reward-Based Learning (Dwight Bergeles, Marshall Hussian-Shuler, Jin Kang)
- Cortical Dynamics of Auditory Perceptual Learning (Dana Boatman, Xiaoqin Wang, Colin Wilson, Anna Korzeniewska)
- The Cognitive Timeline - The Role of the Hippocampus in Reducing Interference (Mike Yassa, Jim Knierim, Noah Cowan)
- Defining the Genetic Basis for Individual Differences in Learning (Mengnan Tian, Richard Huganir, Michela Gallagher, Venkata Mattay)
- Effects of Transcranial Direct Current Stimulation during Spelling Intervention (Kyrana Tsapkini, Argyle Hillis, Brenda Rapp, Peter Barker, Richard Edden, Constantine Frangakis, Martin Lindquist, John Desmond)
- Automated Skill Assessment for Individualized Training in Robotic Surgery (Gregory Hager, Gyusung Lee)
- Fetal Associative Learning (Janet DiPietro, Kelly Tamashiro)
- Insights into Neurocognitive Development from Blindness (Marina Bedny, Akira Omaki, Pablo Celnik)
- Learning to Ignore: A Behavioral and Electrophysiological Inquiry (Joshua Ewen, Howard Egeth, Ana Arenivas)
- A Rapid Neural Assay For Hippocampal Memory Formation (David Foster, William Anderson, Christine Boone, Jon Harrold)
- Perceptual Learning in Sensory Cortex: Cell-Type-Specific Circuit Dynamics (Daniel O’Connor, Shreesh Mysore, Solange Brown, Jeremiah Cohen)
- Deep Multi-view Learning for Acoustic-to-Articulatory-Inversion (Raman Arora, Bonnie Nozari)
• Innovative Technology for Personalized Foreign Language Education (Philipp Koehn, Jason Eisner, Chadia Abras)
• Quantifying Individual Differences in Network Dynamics for Abstract Information Learning (Susan Courtney, Joshua Vogelstein, James Pekar)
• The MicroRNA System in Neurocognitive Aging (Jay Baraban, Michela Gallagher, Rebecca Haberman)
• Learning Causes Changes in the State Space of Local Cortical Networks (Kristina Nielsen, Joshua Vogelstein)
• Enhancing Cerebral Efficiency and Plasticity with TDCS: Effects on Cognition and Cognitive Fatigue (Tracy Vannorsdall, Susan Courtney, Arun Venkatesan)