Continental breakfast will be available to attendees starting at 8 a.m. in the Georgian Room (IMU). Lectures and award presentations will take place in the Whittenberger Auditorium.

8:00-9:00 a.m. Continental breakfast in Georgian Room (IMU)
9:00-9:05 a.m. Welcoming remarks from Ken Mackie, Gill Center Director
9:05-9:10 a.m. Opening remarks from Larry Singell, College of Arts & Sciences Executive Dean
9:10-9:15 a.m. Presentation of Gill Graduate Student Award by Cary Lai, Linda and Jack Gill Chair
9:15-9:35 a.m. Gill Graduate Student Award Lecture by Vijay K. Ramanan (IUOPUI, Saykin Lab)
9:35-9:40 a.m. Presentation of Gill Image Award to James Wagner-Miller by Andrea Hohmans, Linda and Jack Gill Chair
9:40-10:20 a.m. Featured Speaker: Ivan Soldez, University of California, Irvine “Organization and Control of Hippocampal Chronocircuits”
10:20-10:30 a.m. Q & A session by Dr. Soldez
10:30-10:45 a.m. Coffee break in the Georgian Room (IMU)
10:50-11:30 a.m. Featured Speaker: Joshua Dubnau, Cold Spring Harbor Laboratory “Micro-RNA 276a and the Zombie Fruit Fly”
11:30-11:40 a.m. Q & A session by Dr. Dubnau
11:45-1:00 p.m. Lunch in Alumni Hall (IMU)
1:15-1:30 p.m. Presentation of the 2013 Gill Award by Linda Gill, Gill Foundation of Texas
1:30-2:30 p.m. 2013 Gill Award Lecture by Bruce McNaughton,The University of Lethbridge “Doughnuts in the Brain: A Toroidal Attractor Theory of the Cognitive Map”
2:30-2:45 p.m. Q & A session by Dr. Bruce McNaughton
2:45-3:00 p.m. Presentation of the 2013 Young Investigator Award by Jonathon Crystal, Department of Neuroscience “Micro-RNA 276a and the Zombie Fruit Fly”
3:00-4:00 p.m. 2013 Young Investigator Award Lecture by Loren Frank, UCSF “Neural Substrates of Memory and Decision-Making”
4:00-4:15 p.m. Q & A session by Dr. Loren Frank
4:15-4:20 p.m. Introduction to Panel Discussion by Dr. Jack Gill, Gill Foundation of Texas
4:20-5:30 p.m. Panel Discussion moderated by Jack Gill and Richard DiMarchi
5:30-6:30 p.m. Poster session and reception in Alumni Hall/Solarium (IMU)

The hippocampal formation of the mammalian brain is crucial to the storage and consolidation of episodic memories; memories for experiences that unfold in space and time. It accomplishes its role in memory using so-called ‘place-cells’, which provide a unique code reflecting the spatio-temporal context of experiences. This code serves as a tag or ‘index’ that links together sub-components of a given experience which are stored in distributed form throughout the neocortex. The index code is generated by complex interactions of cellular and network mechanisms whose understanding has been greatly facilitated by technologies that enable monitoring cellular activity from large numbers of neurons in the brains of behaving animals. These interactions enable integration of self-motion information to keep track of spatial location, and append information about external and internal events onto the resulting internal spatial coordinate system, thus generating a ‘cognitive map’. Networks in thalamus and midbrain (‘head-direction cells’) compute relative head orientation (azimuth) as animals rotate their heads; cells in medial entorhinal cortex (‘grid cells’) fire in a regular, 2-D periodic, spatial pattern (‘grid field’) when an animal moves about its world. Head-direction and grid cells can be explained by a theory in which pre-wired synaptic matrices determine ring (1-D) or toroidal (2-D; ‘doughnut-like’) manifolds of allowed states (‘attractors’) of network activity. The speed by which the neuronal state is updated relative to the animal’s physical motion in space sets the scale of the 2-D grid field, and there are multiple such grid cell modules, each with a different movement gain, and thus each expressing a different spatial scale. Next, hippocampal place cells, which receive grid field information at multiple spatial scales, provide unique codes for spatial location, possibly by a Fourier synthesis-like summation on their inputs. Finally, inputs from other brain regions, representing features and events in the world, or internal states such as goals, modulate the rate (but not relative location) of place cell firing, thus generating a unique, conjunctive code for ‘what’ happened ‘where’. Although they exhibit a high degree of experience-dependent plasticity, these networks appear to be wired up by a self-organizing process in early post-natal development in a manner that is independent of experience (a priori). Thus, in a sense, Immanuel Kant was correct: ‘Space… originates from the mind’s nature in accord with a stable law as a scheme, as if we were, coordinating everything sensed externally’.

SAVE THE DATE:
The 2014 Gill Symposium & Awards will take place Wednesday, October 15, 2014, on the campus of Indiana University Bloomington. Visit www.indiana.edu/~gillctr for more information and to register.
The Linda and Jack Gill Center for Biomolecular Science

2013 Featured Speakers

Ivan Soltesz, Ph.D.
Chancellor's Professor & Chair, Anatomy & Biology
University of California, Irvine

Micro-RNA 276a and the Zombie Fruit Fly

Joshua Dubnau, Ph.D.
Associate Professor
Cold Spring Harbor Laboratory

Organization and Control of Hippocampal Chronocircuits

Panel with all speakers sharing their perspectives on Science and how model systems can be best used to study memory and cognition

Indiana University
702 N. Walnut Grove Ave
Bloomington, IN 47405
www.indiana.edu/~gillctr

Recognizing scientists who have emerged as international leaders in cellular, membrane, or molecular neuroscience

Wednesday, September 25
Whittenberger Auditorium
Indiana Memorial Union

The Linda and Jack Gill Center for Biomolecular Science