

## COMPUTER SCIENCE & HEALTH INFORMATION TECHNOLOGY

### Researcher/ Principal Investigator

### Summary of Lab/Project & Trainee Opportunities

**Neset Hikmet, PhD, MBA, MS**  
Associate Professor & Director,  
Graduate Studies in Health  
Information Technology

#### ***Health IT Consortium (HITC)***

HITC was created out of the Master's in Health Information Technology Program, Department of Integrated Information Technology (iIT), University of South Carolina (USC) and led by Drs. Hikmet and Schooley. HITC provides research infrastructure services for USC healthcare researchers including virtual desktop, server, and secure storage resources; server side analytics software hosting (e.g., SAS, SPSS, R); electronic survey development and deployment; and custom software development services for specialized research requirements. HITC works with EnQ, LLC in the deployment of software products for pilot testing and potential commercialization. The team has developed solutions and applications for a diverse group of clients, including the U.S. Social Security Administration, U.S. Department of Labor, U.S. Department of Transportation, South Carolina Rural Health Research Center, and other private sector healthcare, pharmaceutical, and public health clients.

<p><b>Benjamin Schooley, PhD</b> Assistant Professor, Graduate Studies in Health Information Technology</p>	<p><b>EnQ Innovation Center</b> EnQ, LLC (<a href="http://www.EnQhit.com">www.EnQhit.com</a>) provides software product development, application development, hosting, and analytics services for the health and medical industry. Through the Healthcare Innovations Center, the company provides software product lifecycle services, from conceptualization through pilot testing and product launch. The company (EnQ, LLC) utilizes its own facilities, staff, and information technology resources and leverages a range of partnerships depending on the product and market focus.</p>
<p><b>BIOLOGY</b></p>	
<p><b>Jeff Dudycha, PhD</b> Associate Professor, Department of Biology</p>	<p><b><i>Evolutionary Ecology of Eye Size and Color Vision</i></b> We have recently developed a tool to measure visual function in the model crustacean Daphnia. We are interested in determining whether visual function declines with age in Daphnia, and if so, whether the rate of decline differs between long- and short-lived Daphnia genotypes. Participants in this project would conduct experiments that use behavioral assays to quantify visual function.</p>
<p><b>Rehka Patel, PhD</b> Associate Professor and Associate Chair, Department of Biology</p>	<p>Extending the healthy lifespan (healthspan) of human beings has been one of the key focus areas of NIH-funded research. Although there are various model organisms currently in use for research on aging mechanisms, each model has limitations in relation to its relevance to human aging. Thus, as a special initiative to establish novel model organisms better suited for research on aging, we have recently undertaken establishment, development, and study of Daphnia, a freshwater crustacean. We have studied the contribution of stress response, telomerase activity, and epigenetics in regulating life span and longevity in Daphnia. The main advantage of this model system is that Daphnia are parthenogenetic organisms that produce large clonal populations in a short time to be able to perform studies with naturally occurring short- and long-lived subtypes. This model thus offers a unique opportunity to examine aging and life span in naturally occurring variants that differ drastically in their relative life spans and are heritable characteristics of such variants. Our papers in this field are the pioneering works establishing Daphnia for molecular work for study of mechanisms of aging.</p> <p>Biology 101 and 302- introductory biology and molecular biology are required</p>

**Alan S. Waldman, PhD**  
Professor of Biological Sciences

***Mechanisms by which mammalian cells maintain genome integrity and hinder the occurrence of detrimental chromosome alterations associated with cancer and aging***

The lab offers an opportunity to participate in hands-on molecular biological research using a model system the researchers developed for studying DNA break repair in cultured human cells. Students will participate in a project aimed at understanding how DNA repair may be adversely impacted by the expression of “progerin,” a protein implicated in accelerated aging syndromes as well as in normal aging. Researchers hope to further insight into how corruption of DNA repair pathways may play a role in the aging process.

**Activities in which trainee may be involved:**

- Basic mammalian cell culture, DNA transfection, DNA purification, DNA sequence analysis, DNA repair substrate design
- Western blotting to assess protein expression and Southern blotting to examine DNA rearrangements
- Training in experimental design and interpretation, as well as training in how to clearly communicate research results

Course Requirements: individual has completed a molecular biology course and associated lab.

## MEDICINE

**Meera Narasimhan, MD**

Associate Provost, USC Health Sciences

Professor & Chair,

Department of Neuropsychiatry & Behavioral Sciences,

USC School of Medicine

***1. Use of Telemedicine in Neuropsychiatry & Behavioral Science Research***

With involvement in two telemedicine projects, a trainee would have the opportunity to learn all about telemedicine, its equipment, and capabilities.

**Activities in which trainee may be involved:**

- Assist with recruitment and enrollment in one project (ICARE)
- Observe the telemedicine consultation process (with patient permission)
- Assist with data collection
- All project activities under supervision
- Literature searches

***2. Medications to help reduce craving for marijuana in people with schizophrenia***

Trainee would have the opportunity to learn about schizophrenia (and other mental illnesses) and the high comorbidity between mental illness and substance use.

**Activities in which trainee may be involved:**

- Assist with recruiting efforts for 1-2 hours a week
- Literature searches

<p><b>Narendra Singh, PhD</b> Research Professor, Pathology, Microbiology, and Immunology USC School of Medicine</p>	<p><b><i>Understanding the molecular mechanisms and pathways through which environmental toxicants, like dioxin (TCDD) alter the immune functions.</i></b></p> <ol style="list-style-type: none"><li>1. How activation of Ah receptor (AhR) by TCDD on immune cells transcriptionally regulates various mechanisms and pathways including apoptosis, epigenetic modifications, immune dysfunctions, and T cell differentiation (Th1, Th2, Th17, regulatory T cells etc).</li><li>2. Therapeutic efficacy of resveratrol for treatment of autoimmune diseases (multiple sclerosis, lupus, and diabetes)</li></ol> <p><b>Activities in which the trainee/mentee could be involved</b></p> <ul style="list-style-type: none"><li>- Participation in one or more ongoing projects go include training in lab safety and animal handling.</li></ul>
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<p><b>Souvik Sen, M.D.</b>  Professor and Chair Department of Neurology, University of South Carolina School of Medicine</p>	<p><b><i>Clinical-epidemiological methods to test new approaches for stroke treatment and prevention.</i></b></p> <ol style="list-style-type: none"> <li>1. Periodontal Treatment to Eliminate Minority Inequality and Rural Disparities in Stroke.</li> </ol> <p><b>Activities in which the trainee/mentee could be involved:</b></p> <ul style="list-style-type: none"> <li>-Assist with recruitment and data collection.</li> <li>- Conduct literature searches.</li> </ul>
<b>ENGINEERING</b>	
<p><b>Melissa Moss, PhD</b>  Associate Professor,  Department of Chemical Engineering,  Program Direction,  Biomedical Engineering</p>	<p>Alzheimer’s disease (AD) is a neurodegenerative disease affecting 5.4 million Americans. One physiological hallmark of AD is the buildup of plaques composed of aggregated amyloid-<math>\beta</math> protein. Genetic mutations within the amyloid-<math>\beta</math> sequence that are associated with the disease can alter the protein aggregation process. This project examines various mutations of the amyloid-<math>\beta</math> sequence to assess how these mutations manifest in alterations to the biophysical characteristics of aggregates including stability, aggregation propensity, and conformation as well as how these mutations may be related to disease. Students will learn techniques such as size exclusion chromatography (SEC), SDS-PAGE with Western blot, and fluorescence spectroscopy.</p> <p>One year of general chemistry and one year of general biology required.</p>

<b>PUBLIC HEALTH</b>	
<p><b>Stacy Fritz, PhD, PT</b> Associate Professor &amp; Program Director, Physical Therapy Program, Department of Exercise Science</p>	<p><b><i>NEXT: Neurological Exercise Training</i></b> The goal of the NExT program is to create a place to go “NExT” after formal rehabilitation; to create a facility that removes barriers to physical activity so that individuals with stroke can safely participate in and achieve the benefits of an active lifestyle. For more information about this and other research projects, visit the Blanchard Machinery Company Rehabilitation Laboratory website at <a href="http://sph.sc.edu/dpt/dpt-rehab/">sph.sc.edu/dpt/dpt-rehab/</a></p> <p><b>Activities in which trainee may be involved:</b></p> <ul style="list-style-type: none"> <li>-learning about the importance of physical activity (PA) for stroke survivors</li> <li>-learning about external and internal barriers to participation in PA</li> <li>-learning about ways to help stroke survivors overcome barriers to PA</li> <li>-learn about the development, implementation, and evaluation of tailored, community-based public health programs</li> </ul>
<p><b>Daniela Friedman, PhD</b> Associate Professor &amp; Chair Department of Health Promotion, Education, and Behavior</p>	<p>Recent estimates show that 5.2 million Americans have Alzheimer’s disease. The Institute of Medicine predicts that the future workforce “<i>will be woefully inadequate in its capacity to meet the large demand for health services for older adults if current patterns of care and of the training of providers continue.</i>” University of South Carolina was selected to serve in the role of Collaborating Center in the CDC Prevention Research Centers’ (PRC) <b>Healthy Brain Research Network</b> (SC-HBRN). The SC-HBRN has three specific aims: (1) establish a research agenda concerning cognitive health and healthy aging, (2) advance research in the areas of cognitive health and healthy aging, and (3) support training of students. The work of the network is guided by the CDC’s <i>Public Health Road Map for State and National Partnerships, 2013–2018</i>. Students working with the SC-HBRN will have the opportunity to contribute to:</p> <ul style="list-style-type: none"> <li>-Literature reviews</li> <li>-Education programs</li> <li>-Meetings with stakeholder groups</li> <li>-Data collection and analysis for aging related projects</li> </ul> <p>Previous coursework on public health or aging concepts is highly recommended. Writing sample will be required.</p>

<p><b>Office for the Study of Aging</b>  <b>Dr. Daniela Friedman, PhD</b>  Associate Professor &amp; Chair  Department of Health Promotion,  Education, and Behavior</p> <p><b>Dr. Joseph Lee Pearson MS, DrPH</b>  Associate Dean for Operations and  Accreditation  Health Promotion, Education, and  Behavior</p>	<p><b>The Office for the Study of Aging (OSA)</b> in the Arnold School of Public Health is committed to advancing research and education in aging issues. The growing older adult population presents unique challenges and opportunities in healthcare and long-term care. The OSA houses the Alzheimer’s Disease Registry - a comprehensive statewide registry of South Carolina residents diagnosed with Alzheimer’s disease or related disorders (ADRD). As the nation’s most comprehensive registry of its kind, the Alzheimer’s Disease Registry has maintained a record of diagnosed cases of ADRD in the state since 1988.</p> <p>A student working with the OSA will have the opportunity to contribute to:</p> <ul style="list-style-type: none"> <li>-Literature reviews</li> <li>-Community-based education programs</li> <li>-Meetings with OSA partners and stakeholders</li> <li>-Data collection and analysis for aging related projects</li> </ul> <p>Previous coursework on public health or aging concepts is highly recommended. Writing sample will be required.</p>
<p><b>Julius Fridriksson, PhD</b>  Professor  Communication Sciences and  Disorders  Endowed Chair</p>	<p>Stroke is the leading cause of adult disability in the United States. Approximately 25% of stroke survivors present with aphasia, a language disorder that results from damage to the brain's language areas. While some individuals may fully recover from aphasia, others may experience chronic deficits. Aphasia therapy, delivered by speech-language pathologists, is crucial for recovery; however, little is known about why some people demonstrate recovery and others do not.</p> <p>The primary goal of the Center for the Study of Aphasia Recovery (C-STAR) is to improve the effectiveness of aphasia treatment. To do so, various projects within C-STAR aim to identify factors that predict how a stroke survivor may respond to therapy, as well as how different patterns of brain damage influence an individual's response to treatment.</p> <ul style="list-style-type: none"> <li>• Working with stroke survivors</li> <li>• Learning speech and language analysis software</li> <li>• Learning various techniques in neuroimaging</li> <li>• A career in research, neurology, and/or speech-language pathology</li> </ul>

**Xuemei (Mei) Sui, PhD**

Assistant Professor, Department of  
Exercise Science

***Physical Activity/Fitness, Obesity, and Non-communicable Diseases***

Area of research has been primarily focused on physical activity epidemiological studies by utilizing longitudinal cohorts to explore the complicated relationship between physical activity/fitness, obesity, and non-communicable diseases. Currently, research focuses on identifying the longitudinal patterns of physical activity, fitness, and fatness and their effects on predicting long-term mortality and morbidity outcomes using the Aerobics Center Longitudinal Study and Energy Balance Study populations. Also interested in the role of inflammation played in mediating the association between physical activity and obesity. A second area of research during the past several years is trying to develop innovative lifestyle interventions for weight loss especially among high risk populations such as caregivers of patients with dementia. After finishing up the pilot study by surveying more than 100 caregivers, researchers are working on a manuscript and preparing for the next step which is to implement a pilot intervention program to promote physical activity and weight loss in this special population.

***Activities in which trainee may be involved:***

- Assist with data collection via interview and physical activity monitor
- Communication with participants for follow-up activities
- Assist with biomarkers measurement in the lab
- Conduct literature reviews and have the opportunity to be on the paper depending upon contribution.