Title: Facilitating Navigation through Documents by Individuals with Low Vision
This project will investigate ways of facilitating navigation through documents by individuals with severely impaired vision (low vision) who nonetheless retain some ability to read. The research project will focus on the target case of facilitating use of an outline while conducting a deposition by a lawyer with retinitis pigmentosa. RP causes severe narrowing of the visual field such that an individual with the condition may be able to see clearly in the very center of the visual field but cannot pick up any information from the periphery of the visual field. Without peripheral vision it is impossible to take advantage of the organizational information in an outline. Instead, an individual with a very small visual field must start reading the outline at some point and search forward a word at a time from that point. A similar problem occurs when text-to-speech synthesis is used in screen readers; conversion of text-to-speech begins at one place in the text and proceeds serially from that point. In both situations the ability to navigate to regions of text that are most informative is greatly reduced, making it very difficult to use notes to help in an ongoing task. While the project will focus on the target case of a lawyer with RP conducting a deposition, it is expected that the results could be generalized to other situations where individuals with low vision could benefit from using notes while engaged in goal-directed activities. The goal for this one semester course is to evaluate the feasibility of a larger-scale project aimed at systematic empirical study of text navigation by individuals with low vision and at the development of assistive technology for text navigation that is tuned to an individual's pattern of preserved and impaired abilities.

Title: The effects of physical activity, psychosocial stress, and sleep on inflammation
Coronary heart disease and stroke are two of the leading contributors to mortality and morbidity among adults in the United States. Previous research has shown that inflammation is related to cardiovascular outcomes, yet the development of inflammation in healthy young adults is not well understood. This study investigates lifestyle, obesity and inflammation in college students in order to understand the inflammatory process in young adults. The study objectives are to 1) investigate variation in inflammatory biomarkers and the relationships between biomarker and body composition and cardiometabolic risk; and 2) examine independent associations between inflammation and stress, physical activity, and sleep. We hypothesize that higher concentrations of inflammatory cytokines will be associated with higher waist circumference, abdominal adiposity, blood pressure and lipids. We hypothesize that inflammation will increase in response to baseline psychosocial stress, low physical activity levels, and poor sleep quality/duration, therefore, we expect students with higher chronic stress, sedentary lifestyles, and poor sleep habits will have higher levels of inflammation. Inflammatory cytokine levels, however, will be lower in individuals with higher levels of physical activity, low stress, and those who experience quality sleep. It is hypothesized that the interaction of these three
lifestyle factors (physical activity, sleep, stress) will have a larger impact on inflammation than each individual factor alone. Longitudinal physical activity, sleep (7-days each) and stress (3 days) data will be used to develop a ‘risk index’ that predicts levels of inflammation and cardiometabolic risk. The study will recruit 30 UNC students. Health profiles will be generated via questionnaire, monitoring devices and biomarkers, and will be used to examine inflammation and its relationship to physiological and lifestyle characteristics. The data collection process will occur over total seven days.

Title: Women in Political Technology
Over the past few years, scholars have pursued the first systematic analyses into the organizations and staffers that create and manage contemporary political communication. To date, however, there has been a lack of studies on the experiences of female communication practitioners in this historically male-dominated field, especially in the context of the growing area of political technology. This URCT study inquires into the experiences of women working in the domains of technology, digital media, data, and analytics on political campaigns. We are empirically documenting the overall hiring patterns of women working in the domain of political technology, analyzing a comprehensive dataset (N=876) of all staffers working on Democratic and Republican primary and general election presidential campaigns from 2004-2016. We are also conducting a series of open-ended and semi-structured qualitative interviews with female practitioners in this dataset to learn about their experiences working in political technology. Through these interviews we aim to understand, in a rich qualitative way, if these women have felt supported in the course of their careers, the workplaces that they encountered on campaigns, the mentor relationships they have had and their importance, and the barriers toward women’s advancement in political technology (or the key variables behind their success.)

Title: Diabetes & Dance: Empowering Patients Through Movement
For clinicians and public health researchers, the 29 million Americans with Type II diabetes represent a medical problem of vast proportions. Diabetes is a top-ten cause of death costing billions in medical dollars, increasing by 1.4 million new cases per year. Accordingly, treatments and interventions focus on mitigating physiological symptoms; however, there are also psychological symptoms that need to be addressed. Dance has been studied as a therapy method for many diseases and chronic illnesses. While previous studies have shown the positive impact that dance has had on the physical condition and abilities of patients with chronic illnesses, studies that evaluate the effects of alternative therapy methods such as dance have on a patient's body image and psychological well-being are more novel. This study will focus on the psychological aspects of this particular intervention method. Our hypothesis is that participants in a series of dance classes will show reductions in diabetes distress, improvements in diabetes empowerment, and/or improvements in body image. The rationale for the resulting increased empowerment and body image
is that dance as an alternative form of therapy will allow the patients to express themselves and their experiences with diabetes in a positive manner. This expression will allow the patient to have a better relationship with their diabetes and with their body. During the eight-week dance workshop, participants will learn four different dance styles: Bollywood, Hip Hop, Contemporary, and Latin. Each style is meant to invoke a specific emotion within the participants, and will be explored over the course of 3 bi-weekly classes each. The results from this study may allow parties who work closely with diabetes patients, such as diabetes consultants, physical and psychological therapists, and medical professionals, to learn more about the experiences of diabetes patients, opening avenues for more personalized care options.

Title: Examining Factors Affecting Day-of-Game Ticket Sales for the Durham Bulls Minor League Baseball Club
The objective of this Undergraduate Research Consultant Team project is to partner with the Durham Bulls minor league baseball team to develop a predictive model for home day-of-game (walk-up) ticket sales based on a variety of external and internal inputs. Once the best model with the highest $R^2$-value is established, the URCT would then produce a self-updating, software interface which the Bulls could use to input daily variables and derive attendance predictions. Such a tool would enable the team to better set ticket pricing, schedule promotional elements, and understand more intimately their consumers' behaviors. Bulls team executives have expressed a desire to have software which could produce this sort of analysis and after preliminary discussions with these team executives, the Bulls have already agreed to share ticketing and scheduling data captured over the past five seasons. The URTC would meet with team executives early in the spring to learn more about the team's business objectives and about what team data is currently available. Once the URTC understands both the team's specific business concerns and what sorts of data are available for analysis, students will begin collecting, sorting, and cleaning numerous variables (ticket price, weather conditions, promotional activities, day of week, opponent information, etc.) with the end goal of finding the factors which most predict variance in attendance. Variables would include both data already captured by the team and outside marketing variables such as weather, opponent quality and additional events occurring in the community.

Title: Desferoxamine Coated Suture to Improve Tendon Healing Strength
Injuries to hypovascular regions of tendon and menisci have a low healing potential, and there is a great need to identify effective stimuli for healing of such injuries. Hypoxia inducible factor-1alpha (HIF-1α) is a transcription factor that leads to coordinated expression of genes associated with angiogenesis, glucose transport, matrix metabolism, and cell proliferation. This proposal will investigate local delivery by suture of the HIF-1α regulator, desferoxamine (DFO), to the repair site as a means to improve healing outcomes. The first objective of the proposal is to develop a rapidly biodegradable coating for delivery of DFO on several nonabsorbable suture materials used for tendon repair, and characterize the delivery time course in the lab setting. In the second objective of the proposal, a rat Achilles tendon repair model
will be used to evaluate the in vivo performance of the DFO coated (at two concentrations) suture relative to a control suture with coating alone. We will evaluate early healing outcomes including tensile strength, collagen organization, and vascularity of the healing repair. The expected contribution of the research is that local delivery of DFO on suture to the repair site can serve as a cost-effective and reliable means to increase vascularity and improve healing strength after tendon injury. The new technology will provide the surgeon a tool to spatially direct blood vessel formation by a master switch stimulus in surgical applications where hypovascularity diminishes health outcomes. It is anticipated the described approach will overcome past limitations of using a single growth factor to coat suture in attempts to improve tendon healing.