FY 2020 Awards

Project Director	Edward Ackad
Title	Scaffolded Projects for Applied Numerical Science, Part of a New Course in Computational Science for STEM Students
Award	$8753
Abstract	I am excited about my newly designed class for the physics department on Computational Science that will teach STEM students how to solve problems from many areas of science algorithmically, model systems, program, plot, and visualize data in Python. This award will be used to create and refine six scaffolded computational science projects for the upcoming Physics 219 “Applied Numerical Science” course as well as prepare, submit, and setup the computational infrastructure needed for students in the course. This award will deliver: (i) an educational allocation on the JetStream Cluster (part of XSEDE), (ii) a template for future educational allocations on JetStream, (iii) a simple environment with all the needed software for students to use in the class accessible from anywhere using a web browser, and (iv) four tested and refined scaffolded projects that students will work to compete. The projects will allow students to gain hands-on learning in small steps and focus on the relevant topics since other topics will be already in the scaffolded code. Additionally, these projects will include a full write up explaining the modeling used, mathematics needed, science background, and programming concepts used. Using the Jupyter system, teams of students working together will plot and visualize their results in different ways to gain an understanding for all aspects of the problem (theoretical modeling, mathematical modeling, computational implementation, and the meaning and limitations of their results).

Project Director	Jessica DeSpain
Title	Digital Community Engagement Pathway
Award	$16316.35
Abstract	SIUE’s Digital Community Engagement Pathway (DCEP) is a general education pathway for underserved students in all fields and majors who want to work alongside community organizations to study and address the world’s most pressing problems. A team of faculty have been planning DCEP this year with the support of a National Endowment for the Humanities Humanities Connections Planning Grant. The Pathway’s goal is to increase success rates for underserved students who, because of ACT scores and economic factors, do not have access to High Impact Practices (HIPs). HIPs, which include project-based learning like undergraduate research and community-based pedagogies, improve personal and social development and increase deep learning, practical competence, and speaking and writing ability by more than 50% (AAC&U).

	DCEP students will take a set of core courses together that emphasize interdisciplinary research and problem-solving methods. In addition, in each semester of the first three years, students will enroll in a course of five students called a research team. Research teams will be led by a faculty member and a community partner. Together the team will organize a list of readings and activities to study a major problem in our region, such as food insecurity or the alienation of immigrant communities. Building on research central to the field of digital community engagement, the teams will use interdisciplinary methods to share their work with the broader public, including data mining, mapping, storytelling, networking, and cultural analytics. In this way, the program gives students firsthand experience applying twenty-first century career skills. Students will also learn how to negotiate the civic responsibilities they bear toward others in both physical and digital spaces. The nexus of classroom, community site, and digital space creates a new perspective for students in which they must consciously and constantly reframe their own position in relationship to the community partners with whom they interact. The Pathway will fulfill several general education requirements. In addition to their in-class efforts, students will participate in research summits each summer to help prepare them for the complex problem solving required in their courses and ultimately to ready them for future careers and graduate education. When running with a full cohort, the program will serve 100 students (25 each year). We plan to recruit incoming freshman and hopefully supplement their funding package. The Pathway will also result in reciprocal, ongoing relationships with embedded community partners. With EUE funding, we will train instructors and begin developing courses for a pilot of the Pathway to be implemented in Fall 2020 in existing courses. We will run a one-week faculty workshop from July 22-26. Participants will receive professional development in community-engaged pedagogy, interdisciplinary teaching, cultural sensitivity, mentoring, and digital humanities methods. Though all faculty are welcome, five participants will receive a week of summer salary to draft a syllabus for one of the required courses in the program and workshop it with other members of the project team.

Project Director	Mary Ettling
Title	An Integrated Approach to Digital Badging for Employment Competencies and Modern Liberal Arts Skills
Award	$19750
Abstract	A digital badge is an evidence-based, portable credential demonstrating an earner's proficiency in a specific competency or skill. Digital badges enhance individual's employment competitiveness by highlighting and defining the student's abilities relative to in-demand skills in their field or related skills that contribute to an employee's overall ability to thrive and adapt in a changing workplace. Regional workforce studies such as *Bridging the Talen Gap,* by the Graduate Network! and the St. Louis

	Regional Chamber, demonstrate the increasing demand for professional and industry-aligned credentials as a means of reflecting knowledge and skills. Digital badges are well-suited to meet this need; however, the quality and integrity of the digital badge and the evidence used to demonstrate the earners' knowledge are critical factors in the success of a long-term digital badging program. This project has two main objectives. The first is support of ongoing digital badging efforts at SIUE in order to establish vision, oversight, and a clear path forward for badges. This includes a package of wraparound services from EUE to digital badging stakeholders, including: strategic planning, establishing a steering and support committee, developing operating papers and a common lexicon, and establishing a framework to help faculty align course outcomes with employment competencies. The second objective, supported through matching funds committed to this project, is the development of new standalone digital badges culminating in SIUE's first digital badge constellation, *Separations Chemist.* Together, these activities will ensure that SIUE's approach to badging addresses critical 21st century skills and contemporary workplace needs, with an eye toward consistency, sustainability and engagement with employers and the community. For undergraduates, this proposal is innovative because it allows students to connect and support the myriad University experiences to employment competencies and credentials, including experiences within and outside the classroom that help undergraduate students to integrate relevant skills including course outcomes, experiential learning opportunities, and other skills-aligned learning experiences available to students. These efforts have the potential to establish as SIUE a leader in the development and implementation of employment-aligned digital badges both regionally and nationally, joining institutions such as UC Davis, Carnegie Mellon University, Colorado State, and the Ohio State University in pioneering digital badges that systematize institution's curricular offerings (West-Puckett 2016). This project envisions digital badging through deep alignment with employers and community partners to discover, articulate and develop both technical competencies as well as 21st century liberal education skills, including applied skills (also known as soft skills) such as diversity, teamwork and collaboration, problem solving, IT application and leadership, highlighted in the *Bridging the Talent Gap* report. Finally, this proposal is deeply aligned with two EUE priorities for FY20: High Impact Practices and Innovative Digital Badging initiatives, and gives strong consideration to the development of a sustainable revenue model for SIUE's digital badging program.

Project Director	Keith Hecht
Title	Development and Implementation of a Flipped Classroom Model Using Customized, Interactive, Online Learning Modules and Interactive Case-Based Active Learning
Award	$5700

Abstract	The goal of this project is to fully implement a flipped-classroom model in PHEL 764E: Pain and Palliative Care, utilizing professional-quality interactive online materials for the delivery of content to students outside the classroom setting. The implementation of a flipped classroom model will allow faculty to use valuable classroom time for the use of active learning strategies with a heavy emphasis on case-based application of content. Instead of assigning readings from a text or other third-party source, this project seeks to create unique, interactive, web-based modules to customize the content to the preferred content delivery of today's students while allowing experts in the content area to be directly responsible for the content of these modules. It is important to note this project would be the first course in the School of Pharmacy to use web-based delivery for knowledge-based content. The project will use professional services for the conversion of traditional content to web-based modules as well as for postproduction editing. Additionally, we include a request for software that will allow us to update the modules moving forward as advances are made in this therapeutic area. We include a robust assessment plan that includes comparing the traditional, lecture-based offering of the course in 2019 to a flipped classroom model in 2020. Comparisons will be made regarding students' perceptions of classroom models before and after participating in the course, students' academic performance in the course, and course faculty perceptions of the two classroom models. We plan to present and publish the results of our project in discipline specific venues.

Project Director	Shunfu Hu
Title	Keeping Cartography Relevant: Retraining Faculty and Redeveloping GEOG320 Labs for ArcGIS Pro
Award	$7827
Abstract	The project investigator (PI) of this project seeks the EUE funding to support his substantial time investment to: 1) learn the new ArcGIS Pro software; and 2) redevelop a total of 12 existing lab exercises in GEOG320 Cartography using the new software. With the technological advancement in cloud computing, mobile mapping and spatial big data, Environmental System Research Institute, Inc. (ESRI) has recently released "the next generation of GIS software," namely ArcGIS Pro. ArcGIS Pro offers many advantages over the existing GIS software we currently use, namely ArcMap. First, ArcGIS Pro organizes maps, layouts, layers, tables, tasks, tools, and connections to servers, databases, folders, and styles in one central place called "projects." Second, ArcGIS Pro can connect to ArcGIS Online public content (e.g., base maps, base imagery, etc.). Third, ArcGIS Pro allows maps, layers, geoprocessing tools, or even entire projects to be shared among project team members. Finally, ArcGIS Pro includes essential tools for developers to build apps for dissemination on multiple platforms, such as web, mobile, and desktop, which are very important features for today's digital world. Clearly, the upgrade is not simply a software update (e.g., from ArcMap 9.0 to ArcMap 10.0), but instead a

	paradigm shift (i.e., from desktop environment in ArcMap to online/mobile/cloud platforms) in how the software deals with data sets, geoprocessing, and map documents using new graphical user interface. As a result, GIS employers in the United States have already begun to adopt ArcGIS Pro as their standard for GIS practices and operations, and they employ recent graduates from colleges and universities who know ArcGIS Pro. It is significant for those of us who teach GEOG320 Cartography, GEOG418 Introduction to GIS, and other advanced GIS courses to start teaching our current students with the best GIS practices using ArcGIS Pro. All geography majors and GIS minors are required to take GEOG320. They will all benefit from this redevelopment of the lab exercises as experiential learning opportunity due to the software upgrade. The goal of the project is to prepare our students here at SIUE to be more competitive in the GIS job market. Moreover, the successful completion of the project will have long-lasting impacts on student learning for years to come.

Project Director	Elizabeth Kamper
Title	First-Year Writing Critical Media Literacy Project
Award	$2400
Abstract	The overall goal for this proposal is to create and integrate into first-semester, first-year writing courses (ENG 101) essential units on media literacy – in essence to motivate students to recognize and critically think about the phenomena of “fake news,” “junk science,” and “alternative facts,” phenomena which threaten scientific and academic progress and degrade the health and well-being of our very democracy, a claim that is in no way overstated. The fact that we have come to accept “fake news” (which, by definition, isn’t news) and “alternative fact” (which, by definition, isn’t factual) as commonly-accepted phrases should give us pause. The project would consist of discussions with first-year writing teachers about the media literacy problem as we see it manifesting in our first-semester students; location of a variety of potential sources for integration into 101 courses; development of pedagogical materials for 101 teachers to incorporate into their classes; assessments of those materials with 101 teachers; a limited pilot of the unit in select ENG 101 sessions during the Spring 2020 semester; assessment of the pilot; development of a future plan, based on assessed outcomes, of addressing this cultural condition for SIUE students in their first years of university study. The library portion of the media literacy unit will be designed to challenge students’ understanding of the information ecosystem by examining information environments as they pertain to *searching* as strategic exploration of research topics for first-year writing. When students come to the library, they will work in teams to assess the integrity of sources, examine their own conformation biases, and identify different types of authority and authoritative construction in various media (books, scholarly journal articles, blogs, news, etc.). This focus would support the library curriculum currently being taught to ENG 102 students, but would directly address

	source assessment, reliability, and authenticity issues more conceptually and more generally as applied to our culture and life of the everyday, as opposed to scholarly work. One of the key learning outcomes of these ENG 101 sessions will be for students to develop a sense of self-awareness, to see themselves as consumers *and producers* of information – information that is then distributed for others to consume. Part of this consumption occurs through research and writing in first-year writing classes, a result of the decision-making that happens between information from authorities to be trusted and that which has been manufactured (by the constant creation and circulation of information). This unit will focus on the following elements from the Association of Academic and College Library's Framework for Information Literacy in Higher Education: • authority is constructed and contextual, • information creation as a process, and • information has value.

Project Director	Musonda Kapatamoyo
Title	Badging for the 21st Century Workforce: Introductory Web Design with HTML5/CSS and WordPress Microcredentials
Award	$10859
Abstract	This project is a collaboration amongst the following three SIUE departments: Mass Communications, Office of Educational Outreach, and University Marketing and Communications. Through the Excellence in Undergraduate Education (EUE) grant, the project team will develop a course program that results in two digital badges. The course is intended to address skills needed among current students at SIUE as well as professionals and posttraditional learners in the metro east region. The project tackles this year's EUE priorities in development of digital badges and incorporation of experiential high-impact practices into the curriculum. The proposed special topics 8-week course - MC471 is designed for 16 students who want to learn web design skills in a fast-paced, hands-on environment with the opportunity to earn two associated digital badges to demonstrate their skills to future employers. The two digital badges use different technologies to create multimedia websites. The first one focuses on Hypertext Markup Language (HTML5) and Cascading Style Sheets (CSS) using Adobe Dreamweaver. The second focuses on the WordPress content management system. At the end of the course, students will receive a grade upon successful assessment of skills, up to two digital badges certified by SIUE Office of Educational Outreach. The project budget includes a faculty salary to allow for time to develop the course and compensate effort, as well as funding for assessment activities by students, and support for marketing and logistics of digital badging. The EUE funding will only go towards undergraduate education, including waiving any fees associated with the issuance of digital badges. Non-credit participants will be charged on a fee structure to be developed in partnership with the Office of Educational Outreach. After EUE support ends, modest fees for digital badge assessment will be charged to

	undergraduate students in accordance with University policy, with non-credit cohorts offered at a sustainable cost for both the course and the digital badge assessment.

Project Director	Nima Lotfi
Title	Integration of an Experiential Learning Paradigm into Mechatronics, Robotics, and Control Engineering Curricula in the School of Engineering
Award	$14500
Abstract	Engineers have played a major role in shaping the world since the industrial revolution and especially, in the past few decades, the field of engineering has experienced a tremendous and dynamic growth, mainly due to the advances in integrated circuits and electronics, embedded systems and computers, networks, and intelligent systems. In its commitment to shape a changing world, the School of Engineering at SIUE has undertaken numerous initiatives to be able to provide the best cutting-edge learning experience for the students to prepare them for this fast paced job market. One such effort is the establishment of a new Mechatronics and Robotics Engineering degree program which has seen a remarkable growth in student enrollments since its commencement in Fall 2016. Prospective graduates of the School of Engineering, especially the MRE degree program, require an interdisciplinary knowledge of mechanical, electrical, computer, software, and systems engineering to be able to design smart and autonomous systems and processes to improve human life and welfare. The current curricula in the SoE departments, however, do not encompass sufficient experiential learning opportunities to expose students to the multidisciplinary nature of systems, especially in the field of Mechatronics, Robotics, and Controls. In this project, we propose to build a number of experimental laboratory platforms which can be used in Mechanical, Electrical, Mechatronics and Robotics Engineering and Computer Science departments. These platforms which include: a robotic arm, a hardware-in-the-loop electric vehicle emulator, pressure/fluid level process control experiment, and temperature regulation process control experiment would provide a comprehensive learning experience for the students and familiarize them with various important and integrated 2 disciplines, present in real-world systems. Upon the completion of the development of these platforms, projected to be towards the end of summer, they can readily be used in various courses, including ECE381, ECE365, ME356, ME356L, ME450, ME454/MRE454/ECE467, MRE358, and MRE320, across the School of Engineering. Extrapolating from the enrollment numbers in these courses in the past two semesters, the introduction of these experimental platforms would improve the learning experience of more than 400 students.

Project Director	Barbara Martin
Title	Coming Together: Integrating Innovative Technology into Math Methods Courses for Early Childhood and Elementary Education Majors.
Award	$3320

Abstract	In their 2000 Principles and Standards for School Mathematics document, the National Council of Teachers of Mathematics (NCTM) states, "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (p. 24). Further, the International Society for Technology in Education (ISTE), claims, "technology used effectively, can help all students meet and exceed the rigorous learning goals embedded in the Common Core State Standards by providing access to tools and resources that personalize instruction and creating rich, engaging and relevant learning environments." (ISTE.org). The rapid development of technological innovations paired with this calling for integrated technology in mathematics classrooms presents a substantive challenge to pre-service teacher education. The purpose of the study is to advance the discussion on effective integration of technology in early childhood and elementary mathematics classrooms through teacher education. Our argument, grounded in theories and research from the technological pedagogical content knowledge (TPaCK) framework (Koehler & Mishra, 2009) is that a holistic approach to educating pre-service teachers should engage learners in activities in which they can develop mathematics specific content through the use of best pedagogical practices, and innovative technologies. Towards this goal, pre-service teacher preparation programs must present educational technology, pedagogy, and mathematical knowledge for teaching as an integrated whole, rather than individual components. This study will analyze pre-service teachers' course work from Early Childhood and Elementary Teacher Preparation Math Methods courses for specific evidence of the different, developed TPaCK constructs.

Project Director	Lawrence Norcio
Title	Chem 120B Redesign
Award	$12136.58
Abstract	The objective of this project is to redesign Chem 120B – General, Organic, and Biological Chemistry 2. This course is required for all students in the undergraduate Nursing programs, and also counts as a distribution course for Sciences. The Department of Chemistry will implement the Peer-Led Team Learning (PLTL) Program. This program will divide Chem 120B students into smaller groups (maximum of 10 students) which will meet for 50 minutes, once a week in the semester. Each PLTL session will be led by students who had successfully completed Chem 120B. This project also aims to: a) identify topics in Chem 120B that students find very challenging; b) design PLTL worksheets that will resolve these difficult topics; and, c) train prospective Peer Leaders. The implementation of PLTL program on Chem 120A – General, Organic, and Biological Chemistry last Fall Semester 2018 had been very successful. The Department of Chemistry is convinced that it will get the same effects when applied to Chem 120B. These positive results are increased passing rates and improved student grades.

Project Director	Barbara O'Donnell
Title	Building a Partnership with Universidad Gerardo Barrios, San Miguel, El Salvador
Award	$7765
Abstract	Receiving this grant would provide opportunities for Southern Illinois University Edwardsville undergraduates to experience full immersion in a second language, a new environment, and a Latin American culture. This project addresses High-Impact Educational Practices, in that SIUE teacher candidates will be involved in critical inquiry situations, build a community of learners among themselves, and with peers in El Salvador, and explore cultures, life experiences, and worldviews different from their own. Due to the full immersion aspects and requirements of this project, there is evidence that a new digital badge in intercultural understanding could be designed and awarded. Faculty in the Department of Teaching and Learning are creating a study abroad partnership with the Universidad Gerardo Barrios (UGB). Faculty in the College of Arts and Sciences who teach Spanish, TESOL, ELL and ESL teacher candidates also lend their support. This project involves a three week exchange program for SIUE undergraduates to study the educational practices of teaching second language learners. SIUE faculty traveling with undergraduates would provide professional development for UGB faculty in the areas of differentiating instruction, project-based learning, metacognition and mindfulness in language learning and teaching, and flipped classrooms. In return, UGB students becoming English teachers would visit SIUE each year for 3-4 weeks. The faculty accompanying them would provide SIUE faculty with professional development in understanding the challenges of English language learning and teaching at a college level, ESL assessments in a Spanish speaking country, second language acquisition from students and faculty perspectives, planning for ELL/ESL Learners, and instructional techniques for ELL/ESL Learners in a non-native English environment. SIUE students earn 6 credit hours from SIUE towards an ESL/ELL endorsement, and UGB students earn course credits from UGB. In both exchange experiences, undergraduates will observe and interact with on-campus classes and local public school classes ranging from Pre-K through High School. In addition to these benefits, students from both universities will develop socially and emotionally. The teacher candidates who will participate will understand, empathize, and possibly see actions they can take to improve education and the teaching profession so that more students have access to quality educational education experiences, both here and in El Salvador.

Project Director	Kathleen Vongsathorn
Title	Integrating STEMM and History Curriculum through Travel Study
Award	$17822
Abstract	This proposal requests EUE funds to help implement a four-week program on "Science, Technology, and Medicine in the History of Britain and its

	Empire," for STEMM (the second M for medicine) and History majors, in London, England in the summer of 2020. This travel study program is part of a broader project to develop an undergraduate curriculum integrating history and STEMM curriculum. The proposed program will pursue two high-impact educational practices in integrating Humanities and STEMM curriculum: global learning and the creation of a learning community. Research suggests that global learning, particularly through study abroad programs, positively affects students' global awareness, academic performance, and personal and professional development (Chieffo & Griffiths, 2004; Donnelly-Smith, 2009; Ingraham & Peterson, 2004). This program will facilitate undergraduates' global learning both through the experience of living and travelling in a foreign country, and through course content that emphasizes science, medicine, engineering, and technology in the history of Britain and its global empire. A learning community will be facilitated through shared coursework, projects, travel, and living arrangements. Another element of this learning community will be the faculty member: faculty-led travel study programs can have a particularly strong influence on students' academic and career success, in part because contact with faculty outside of the classroom increases student retention and degree completion (Brandenburg et al.; Metzger, 2006; Pascarella, 1980; Xu, de Silva, Neufeldt, & Dane, 2013). The integration of STEMM and Humanities curriculum also has the potential to help undergraduates cultivate personal and professional skills that are critical to working in an increasingly globalized world, for example in communication, collaboration, and intercultural competence. For STEM students, engaging with history can, according to microbiologists Casadevall and Fang, "illuminate social influences on the scientific process, allow scientists to learn from previous errors…provide a greater appreciation for the importance of serendipity in scientific discovery…and call attention to evolving ethical standards in science. History can make science better" (Casadevall & Fang, 2015). For health students, according to physicians Mackowiak, Parker, and Croft, engagement with history can: "reveal the limitations of current evidence, encourage openness to change, place clinical practice and proper context, and promote humanism" (Mackowiak, Parker, and Croft, 2016). Travel study opportunities for STEM students at SIUE are relatively scarce, and this program will directly impact up to ten students, preferentially recruited from STEMM majors. The indirect impact of the program would be much greater, as students share their travel study experiences with their peers, and would potentially encourage further student engagement with courses covering STEMM content in Humanities and Social Sciences on campus. EUE funding is sought to defray the costs of participation in this program, so as to facilitate the participation of a more equitable and inclusive group of students than might be able to study abroad otherwise. In conclusion, I hope to organize a travel study program emphasizing experiential learning through encounters with buildings, objects, texts, and people, which fosters skills and abilities, personal and professional, which are in demand in an increasingly global workplace.