

2019 PROVOST'S LEARNING INNOVATIONS GRANTS

APPLICATION

INSTRUCTIONS

1. Complete this Application Form and save as "Lastname_Firstname_APP" (using your name).
2. Ask your Department Head to complete the Department Head Certification, scan and save as, "Lastname_Firstname_SIG" (using your name).
3. Email all documents to plig@rit.edu, **no later than 11:59pm ET, January 21, 2019.**

If you have any questions about completing this application, please contact Michael Starenko at 585-475-5035 or mssetc@rit.edu.

APPLICANT INFORMATION

This application is for a (please select *one* type of grant):

- Exploration Grant
 Focus Grant – Active Learning Across All Course Modes

Principal Applicant Name: Esa M. Rantanen

Faculty Title: Associate Professor Email: emrgsh@rit.edu Phone: 5-4412
(Full-time only)

College: Liberal Arts (CLA) Department: Psychology

Department Head Name: Joseph Baschnagel Email: jsbgsh@rit.edu

Others involved in the project (if any): NA

Project Name: Redesign of a Graduate Engineering Psychology Course for Online Delivery

Total Funds Requested (as calculated on the budget worksheet on the next page): \$5,000
(requests of \$1,000 to \$5,000 will be considered)

BUDGET

Complete the table below to calculate your budget

- The total shown on this worksheet must match the "Total funds requested" in the Applicant Information section on page 1 of this application form.
- If awarded, additional funds will be provided to cover any benefits and ITS expenses associated with the salary budget requested.
- Note that any equipment or other materials purchased with grant funds are the property of your department and revert to the department after your project is completed

Personnel	Purpose/Justification	Amount
Full-time Faculty/Staff		
Esa Rantanen	Course buy-out	4000
Adjuncts, Part-time Faculty/Staff, Summer Salary		
Rebecca Johnson	TLS/ILI Instructional Designer, consultant	0
Student Workers, Graduate Assistants		
TBD (programmer)	Develop lab modules for the course	1000
Personnel Total		\$ 5000.00
Equipment	Purpose/Justification	Amount
Equipment Total		\$ 0.00
Travel	Purpose/Justification	Amount
Travel Total		\$ 0.00
Other (Specify)	Purpose/Justification	Amount
Other Total		\$ 0.00
Total Award Requested		5000.00

STATEMENT OF UTILITY (two pages maximum)

Using the evaluation criteria outlined in the [Proposal Evaluation](#) section of the PLIG website, please provide an overview of the project you are proposing, including:

- Project objectives
- An explanation of the teaching/learning problem(s) it is designed to address
- An explanation of the significance of the project to student outcomes and/or the student experience.
- A brief description of how the project integrates with activity already underway at RIT in a priority area and/or how this approach has been successfully used at RIT already.

Project Objectives

This project will develop and deliver an online graduate course, PSYC 714 “Graduate Engineering Psychology”, which is part of an Advanced Certificate (AC) program, the Advanced Certificate in Engineering Psychology (ENGPSY-ACT). Thorough documentation of the development of this course will also allow two other required courses in the ENGPSY-ACT program be redesigned for online delivery, effectively making the entire ENGPSY-ACT and online program (there already are several online graduate courses offered at RIT that would serve as electives in the program).

The Problem

The ENGPSY-ACT was approved by Academic Senate on January 25, 2013. Since then, several graduates from the MS in Experimental Psychology (EXPSY-MS) have earned the AC as part of their regular MS curriculum. The ENGPSY-ACT was also designed to benefit students in other graduate programs at RIT, specifically in Industrial Engineering (ISEE-MS) and Human-Computer Interaction (HUMCOMP-MS), but also professionals working in industry who are unable to leave their jobs to enroll in a graduate program but would nevertheless like to burnish their credentials. However, very few people outside the EXPSYC-MS program have had access to it. The primary problem is scheduling. In particular, the three required courses have historically been scheduled in conflict with courses in the other graduate programs at RIT, and at times of the day when industry professionals are unable to come to campus to attend them.

Significance

Converting the entire ENGPSY-ACT program to online format would substantially improve its accessibility to students from diverse disciplines as well as to people outside RIT. The proposed project would also create a procedure and template for conversion of the other two required courses in the ENGPSY-ACT program, which would allow for the entire program be offered online. A redesign of a course that is part of a larger program will also allow for coordination of the contents of the courses in the program so that they are complementary and form a coherent whole. Finally, I will develop the course to meet an external standard, that of the Core Competencies of the Board of Certification for Professional Ergonomics.

Integration with RIT Priorities

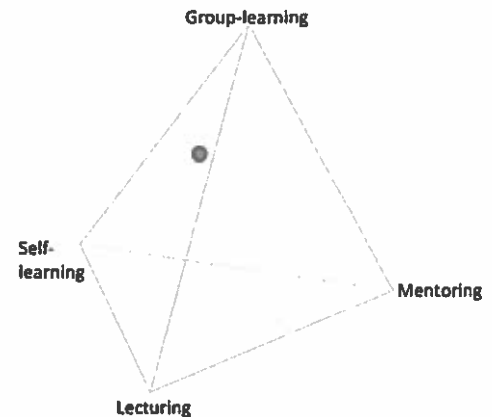
The proposed online offering is perfectly aligned with the RIT strategic goal to develop and execute new flexible course delivery models by offering more online options in graduate programs. A program such as the ENGPSY-ACT will also serve as outreach to nontraditional students. This project is also a first step in the process of making the ENGPSY-ACT part of RITx MicroMasters program.

STATEMENT OF CREATIVITY (three paragraphs maximum)

Provide a brief description of how this is a novel approach, or a new application of an existing mode or model of teaching and learning, and/or research about how teaching and learning represents a new paradigm.

There are four aspects of the proposed course conversion that make it novel and innovative:

(1) The course will maximize the *affordances* of its delivery medium, that is online using RIT's course management system myCourses. This is first and foremost a theoretical question, which will be examined within the project through an exhaustive literature review. The working hypothesis is that an online course will occupy a place with a space (a tetrahedron) bounded by four primary learning methods (at the vertices; see the figure at the right) and that given the affordances and constraints of the online format, an *optimal* spot may be defined for the course. Hypothetically, although an online course will involve some lecturing (videos) and one-on-one mentoring with direct interactions with the instructor, learning will be heavily weighted towards self- and group learning. Therefore, the course design should maximize the benefits afforded by these learning methods.



The above theoretical question and the hypothesis will be tested in the design and delivery of the course, presently scheduled for the spring semester 2195. There are two specific affordances of online format that will be in the focus of the course redesign. First, because the course involves several (presently 7) lab exercises, it very well meets the definition of *active learning*. The labs require the students think through the theoretical underpinnings of each topic covered, test their understanding of the theory by selecting and manipulating appropriate *independent variables* and *predicting* the effect(s) on relevant *dependent variables* and measuring them. The labs also require development of the technical skills of experimental design, including *control* of extraneous variables, and data collection and analysis. Finally, the students will learn to communicate their findings in a clear and persuasive manner in lab reports. The challenge is to coach students to perform the labs and facilitate group learning through effective interactions with their classmates in an online environment. Second, writing skills are inherently important in an online course where most of the communication must happen asynchronously in writing (Thaiss & Zawacki, 2006). With at least 7 short writing assignments (technical lab reports) the students will also work on a long paper assignment, which will have the format of a research proposal on a topic of their choice but relevant to the general course theme (engineering psychology) and based on their review of relevant literature (Poe, Lerner, & Craig, 2010).

(2) The course contents will reflect my research over past 8 years on the knowledge and skills expectations for new human factors/ergonomics (HF/E) professionals (engineering psychology is a subdiscipline of HF/E; Rantanen & Moroney, 2011; Rantanen & Moroney, 2012; Moroney & Rantanen, 2012; Rantanen & al., 2013; Rantanen, 2016; Rantanen & al., 2016; Rantanen, & al., 2018). Tracking the knowledge and skills expectations in the workplace is an ongoing activity and therefore the course redesign must accommodate periodic revisions to the knowledge and skills it is designed to impart to students. Such flexibility will be a design criterion for the proposed course.

(3) The course contents will also be created to meet an external standard, that of the Core Competencies as defined by the Board of Certification for Professional Ergonomics (BCPE). The mission of the BCPE is to provide ergonomics certification to protect the public, the profession, and its professionals by assuring standards of competency and advocating the value of certification. There are two levels of certification, professional and associate, and three designations reflecting the certificant's primary area of competence. The associate level is seen as an optional, temporary, stepping stone to the professional level, and as such, and appropriate standard and criterion for the ENGPSY-ACT. In other words, the goal is to develop the courses in the ENGPSY-ACT to meet the criteria for a professional certification by designing the courses according to the published core competencies. Not only would such criteria provide external validation for the advanced certificate offered by RIT but also help students earn independent certification of their competence upon completing the 5 courses required for the ENGPSY-ACT.

(4) The research for and development of the engineering psychology course within the proposed project will be extensively documented. This documentation will be designed in such a way that it will serve as a handbook and a template for similar conversion of other courses, first the other two required courses in the ENGPSY-ACT program (PSYC 712 “Graduate Cognition” and PSYC 715 “Graduate Perception”), but conceivably also serving all the faculty at RIT who may wish to convert their courses into online format.

- Moroney, W. F., & Rantanen, E. M. (2012). Student perceptions of their educational and skill needs in the workplace. *Proceedings of the 56th Annual Meeting of the Human Factors and Ergonomics Society* (576-580). Santa Monica, CA: HFES.
- Poe, M., Lerner, N., & Craig, J. (2010). *Learning to Communicate in Science and Engineering*. The MIT Press: Cambridge, MA.
- Rantanen, E. M. (2016). Trends in knowledge and skill expectations for new human factors professionals. *Proceedings of the Human Factors and Ergonomics Society 2016 Annual Meeting*, 60(1), 370-374. SAGE Publications.
- Rantanen, E. M., Boehm-Davis, D., Boyle, L., Hannon, D., & Lee, J. (2016). Education of future human factors professionals. *Proceedings of the Human Factors and Ergonomics Society 2016 Annual Meeting*, 60(1), 418-421. SAGE Publications.
- Rantanen, E. M., Claeys, C., Roder, D., & Moroney, W. F. (2013). Archival human factors jobs database as a tool for tracking trends in skills and knowledge expectations in the labor market. *Proceedings of the 57th Annual Meeting of the Human Factors and Ergonomics Society*. Santa Monica, CA: HFES.
- Rantanen, E. M. & Moroney, W. F. (2012). Employers’ expectations for education and skills of new human factors/ergonomics professionals. *Proceedings of the 56th Annual Meeting of the Human Factors and Ergonomics Society* (581-585). Santa Monica, CA: HFES.
- Rantanen, E. M. & Moroney, W. F. (2011). Educational and skill needs for new human factors/ergonomics professionals. *Proceedings of the 55th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 530-534). Santa Monica, CA: HFES.
- Rantanen, E. M., Rantanen, A. G., Rickel, S., & Lau, M. (2018). Cross-Training in Design and Human Factors. *Proceedings of the Human Factors and Ergonomics Society 2018 Annual Meeting*, 62(1), 364–368. SAGE Publications.
- Thaiss, C., & Zawacki, T. M. (2006). *Engaged Writers and Dynamic Disciplines: Research on the Academic Writing Life*. Boynton/Cook, Heinemann: Portsmouth, NH.

STATEMENT OF EFFICACY (two pages maximum)

Provide a brief description of the experiment/research design, methodology, and methods of data collection and analysis you will use to gauge efficacy.

Measurement of student learning in courses offered at RIT is a research question in its own right that will be examined with the development of this course. The question is a difficult one, for often the true efficacy of educational experience may only be manifested after a substantial time lag, when the students are already in the workforce and faced with challenges there. I intend to continue my efforts to track the knowledge and skills expectations for new human factors/ergonomics (HF/E) professionals referenced in the previous section, with the potential of longitudinal tracking of individual students who have completed the ENGPSY-ACT.

In the short term (i.e., within the semester the course is offered), the design of the course will include systematic longitudinal tracking of student progress throughout the course using both objective and subjective measures. Objective measures will include quizzes on student understanding of not only the weekly topics covered but also questions that allow for evaluation of development of their thinking in terms of systems as well as critical thinking skills. The latter will be developed based on the critical thinking literature reviewed as part of the project. Subjective measures include several (e.g., biweekly) surveys of student perceptions of the instructional materials and methods in the course.

An additional measure of efficacy of the course (and the courses in the ENGPSY-ACT program) will be through the external standard provided by the BCPE core competencies. Students will be encouraged to take the BCPE exam for an associate certification. I will also explore opportunities to provide students funding to offset the examination fees.

ADDITIONAL CONSIDERATIONS

Please address these questions, if needed.

Will your project require assistance for extensive or unusual media, multimedia, simulation, and/or software development? If so, please explain?

The project will require software development. The current, in-class version, of the PSYC 714 course includes 7 separate lab exercises where students run experiments of their own design and analyze their data to gain first-hand experience in relevant methods and interpretation of data. However, these lab exercises must be redesigned for online accessibility, either as stand-alone programs students can download and modify according to their own experimental designs or to run online using their browsers (or both). A student programmer competent in relevant programming languages (e.g., PsychoPy) will be hired with the help from the PLIG grant to create the labs according to my specifications.

All courses offered by RIT must be accessible to students with disabilities, according to Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990

(rit.edu/studentaffairs/disabilityservices/info). Is your proposed teaching approach accessible to all students, with reasonable accommodation? If not, please explain.

Because the course will be offered online, and because all the interactions with the instructor will be in writing (apart from captioned short video lectures), and because the lab exercises will only use visual stimuli, the course will be eminently accessible to the deaf and hard-of-hearing (DHH) students at RIT without a need for any other accommodations (interpreters, note-takers, &c.). Unless a student has a disability that prevents them from using their own computer, the course will be accessible to them.

RIT abides by the Family Educational Rights and Privacy Act of 1974 (FERPA), which prohibits instructors from making students' identities, course work, and educational records public without their consent (rit.edu/xVzNE). Will any data gathering or sharing for your project raise any FERPA issues? If so, please explain.

The course will be administered via RIT's myCourses system, access to which is secure through password and two-factor authentication, all interactions in the course are secure. The lab exercises require students to collect data about their own performance, but all data will only be reported via myCourses and kept confidential between the student and the instructor.

DISSEMINATION AGREEMENT

By completing this grant application, I agree to provide the materials and services described here, in support of disseminating what is learned from this project to the RIT community.

I also agree to return all/a portion of the funds that I receive for this project to RIT if I fail to complete or provide the materials described here:

- Full Project Plan (*including roles and responsibilities, milestone dates, and pertinent project details*)
- Preliminary Findings report (*may include experiment/study design, lessons learned, initial data collection, and/or literature review summary*)
- Participation in an ILI/TLS Preliminary Findings Roundtable dissemination event (*share and discuss your preliminary findings with your PLIG cohort*)
- Final Summary of Findings (*including data collection, lessons learned, implications for further study, and which may be in the form of an article abstract, conference presentation outline, or short report*)
- Final budget accounting (*reconciliation of budget provided with your application and the actual project expenses*)
- Participation in an ILI/TLS PLIG Showcase dissemination event (*present a poster or other display at the annual Showcase*)

By submitting this application, I accept this agreement. _____ (*applicant, please initial here*)

TIMELINE AND TASKS

Please indicate any variances to the planned PLIG 2019 schedule as described in the above Dissemination Agreement and the reasons for this variance. *If you do not intend to deviate from the schedule, you may leave this section blank.*

Task	Date	Proposed Variance and Reason
Full Project Plan submitted to TLS	August 16, 2019	
Preliminary Findings report submitted to TLS	January 10, 2020	
Participation in an ILI/TLS Preliminary Findings Roundtable dissemination event	February, 2020	
Summary of Final Findings report submitted to TLS	August 21, 2020	
Final Budget Accounting report submitted to TLS	August 21, 2020	
Participation in an ILI/TLS PLIG Showcase dissemination event	November 2020	

DISSEMINATION PLAN (*optional*)

Provide details about the journals, conferences, shows, or other external vehicles with strong potential for dissemination of your results (in addition to the ILI/TLS Preliminary Findings Roundtable and PLIG Showcase dissemination events). Include supporting documentation, such as preliminary interest or acceptance, with your application, if available. (*Please note that special consideration will be given to proposals that have a defined opportunity for external dissemination, such as an academic journal or professional conference.*)

Development of an online engineering psychology course is of interest to the HF/E community for two reasons, for it (1) makes discipline-specific education accessible to ever wider audiences, and (2) the usability and user experience of the course itself is an interesting HF/E problem, for which my efforts and success will be worth reporting in the open literature. Specifically, I plan to publish the work on this project in one or more of the following publications:

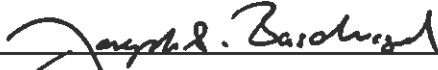
- *Ergonomics in Design: The Quarterly of Human Factors Applications*, published by SAGE Publications, is a peer-reviewed journal intended to serve the needs of practicing human factors/ergonomics professionals who are concerned with the usability of products, systems, tools, and environments.
- *Human Factors: The Journal of the Human Factors and Ergonomics Society* publishes peer-reviewed scientific studies in human factors/ergonomics that present theoretical and practical advances concerning the relationship between people and technologies, tools, environments, and systems.
- The Human Factors and Ergonomics Society (HFES) publishes the papers and abstracts from presentations at the Annual Meeting in the peer-reviewed *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*. In particular, the *Education Technical Group* (ETG) of the HFES is concerned with the education and training of HF/E specialists. Work on the development of this course and the ENGPSY-ACT would make for welcome presentations and demonstration at the HFES Annual Meetings, with proceedings papers to document the work.
- *Computers in Human Behavior*, published by Elsevier Science, is a peer-reviewed journal dedicated to examining the use of computers from a psychological perspective, including articles exploring the use of computers for training.

DEPARTMENT HEAD CERTIFICATION

I support this PLIG application and verify that the principal applicant is a full-time faculty member in good standing in my department.

Principal Applicant Name: Esa M. Rantanen

Department Head Name (PRINT): Joseph Baschnagel Email: jsbgsh@rit.edu

Department Head Signature:  Date: 1/30/19

NOTE: When signed, please scan and email with your Application Form to: pliq@rit.edu