

2019 PROVOST'S LEARNING INNOVATIONS GRANTS CALL FOR PROPOSALS

The **Provost's Learning Innovations Grants** (PLIG) program was developed to broaden and enrich the learning experience of RIT students by funding faculty-initiated projects that enhance student learning. Managed by the Innovative Learning Institute (ILI), this program has been designed to:

- Better support dissemination of individual faculty learning to the wider faculty population
- Integrate funding with Institute priorities
- Support the scholarship of teaching and learning

I. ELIGIBILITY

All full-time RIT faculty (tenured, tenure-track, visiting, lecturers, etc.) are eligible to apply.

II. GRANT TYPES

There are two types of grants—Exploration and Focus—for PLIG 2019. Full details are available on the [Grants Types](#) page of the PLIG website (www.rit.edu/plig).

III. USE OF GRANT FUNDS

Provost's Learning Innovations Grants for 2019 may range from \$1,000-\$5,000.

Examples of the use of PLIG funds include:

- Course release (reasonable, actual replacement costs for faculty members removed from teaching)
- Development of new technology-based learning tools and/or environments
- Technologies or equipment required that are not normally provided by the department/college
- Resources for research design and consultation, data collection and aggregation, instrument development and/or purchase, secure data storage, data analysis, and report generation
- Travel to support research activity and/or meet with potential funding sources

IV. PLIG TIMELINE AND TASKS

The grant timeline assumes that most recipients will use the Spring 2019 and/or Summer 2019 term(s) to plan and develop their PLIG-funded project for delivery or implementation during the Fall 2019, Spring 2020, and/or Summer 2020 term(s). The full [timeline](#), including grantee tasks, is available on the PLIG website.

V. SELECTION COMMITTEE AND EVALUATION CRITERIA

Applications for PLIG funds are evaluated by the [PLIG selection committee](#) according to the following criteria:

- *Utility* (solves a defined problem; has potential to benefit many courses/faculty)
- *Creativity* (is a novel approach or application; represents a new paradigm)
- *Efficacy* (uses an evidence-based approach; impact to student learning and/or the student experience can be demonstrated)

The criteria are further defined, illustrated, and explained in the [Proposal Evaluation](#) section of the PLIG website.

VI. QUESTIONS

Please email plig@rit.edu with any questions about the PLIG process.

(Examples of previously funded projects are available in the [Previous Awards](#) section of the PLIG website).

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: Carlos Rivero

Faculty Title: Assistant Professor **Email:** crr@cs.rit.edu **Phone:** 585.475.2979
(Full-time only)

College: GCCIS **Department:** Computer Science

Department Head Name: Mohan Kumar **Email:** mjkvcs@rit.edu

Others involved in the project (if any): _____

Project Name: GRAV: A visual tool for helping students understand graph algorithms

Total Funds Requested (*as calculated on the budget worksheet on the next page*): \$4,800
(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		
Adjuncts, Part-time Faculty/Staff, Summer Salary		
Student Workers, Graduate Assistants		
Graduate Research Assistant	\$15/hr x 20hr/wk x 16wks	
	Software development & documentation	\$4,800.00
Personnel Total		\$ 0.00
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		\$4,800.00

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.
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A large number of contemporary information systems rely on tables containing tuples to represent and store data. However, in many domains, graphs containing nodes connected through edges are natural candidates for modeling data that do not adhere to flat, tuple-based representations. Sample domains are social networks, citation networks, protein-protein interactions, road networks, or knowledge graphs. Due to a recent interest in modern applications using graphs, we are witnessing advances in graph modeling, management and processing at all levels.

The PI has been working on the following curriculum development activities for the past two years at RIT:

- CSCI-320 – Principles of Data Management: the PI has introduced research topics related to graph databases in this undergraduate, required course. In addition to “traditional” relational databases, undergraduate students in sections taught by the PI learn document-oriented and graph-based databases, and different comparisons among them.
- CSCI-723 – Advanced Database Skills: Graph Databases: First run as a graduate seminar and now as a permanent course, the PI has created this new upper-level course from scratch completely focusing on graph databases. Students learn and implement advanced graph-theory algorithms over existing graph databases to increase their functionality.

Other courses that deal with graphs include CSCI-261 – Analysis of Algorithms, CSCI-620 – Introduction to Big Data, CSCI-665 – Foundations of Algorithms, ISTE-384 – Introduction to Geographic Information Systems, ISTE-484 – Thematic Cartography and Geographic Visualization, or ISTE-742 – Introduction to Geographic Information Systems. In all cases, students need to understand and implement algorithms for graph processing, such as path finding, connectivity inspectors, or subgraph identification. These algorithms are usually difficult to grasp since they involve complex operations.

The PI proposes GRAV (GRaph Analysis and Visualization), a visual tool to help students understand and grasp fundamental concepts in graph algorithms. GRAV will allow visualizing graphs and performing several well-known operations over them. Students will provide their own implementations of certain algorithms and, by means of Application Programming Interface calls, GRAV will show the progress of such algorithms and their different steps. The PI’s hypothesis is that the visualization of such progress will help students grasp graph algorithms, and further develop their computational problem solving skills.

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.

The PI has identified several approaches in the state of the art for visualizing graph algorithms [1, 2, 3]. However, such approaches are not publicly available, and do not provide an Application Programming Interface to make them flexible and adaptable to different contexts. GRAV will be an open source project publicly available on GitHub, and the PI will disseminate the tool in different forums aiming to create a community of users.

From the teaching perspective, GRAV will allow instructors to visualize common issues or special cases to be presented during lectures. As such, GRAV has the potential to become an important tool to promote active learning and critical thinking among students at RIT, since these students may reflect on their understanding of graph algorithms and concepts.

[1] Mingshen Wu: Teaching graph algorithms using online java package IAPPGA. SIGCSE Bulletin 37(4): 64-68 (2005).

[2] Jeff Lucas, Thomas L. Naps, Guido Rößling: VisualGraph: a graph class designed for both undergraduate students and educators. SIGCSE 2003: 167-171.

[3] Sami Khuri, Klaus Holzapfel: EVEGA: an educational visualization environment for graph algorithms. ITiCSE 2001: 101-104.

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.

To gauge efficacy of GRAV, the PI will rely on teaching evaluations for the sections taught using the tool. The PI will analyze comments provided by students on teaching evaluations. The PI will also aim to conduct one-on-one interviews with some of these students to further understand whether GRAV was helpful, and suggestions for improvement. Another measure of efficacy will be the potential creation of a user community around GRAV, i.e., if other instructors outside RIT adopt and implement GRAV in their own courses. The dissemination plan includes reaching out to other universities.

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?

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.

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.

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. CRR (*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.)*

The PI will publicize GRAV at GCCIS and conduct seminars on its use for other instructors to adopt it. GRAV will also be showcased at ImagineRIT for broad public dissemination. GRAV will be publicly available as an open source repository on GitHub along with a user manual to engage other instructors on its usage. The PI will reach out to other universities to ensure adoption of GRAV.

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: Carlos Rivero

Department Head Name (PRINT): _____ **Email:** _____

Department Head Signature: _____ **Date:** _____

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