

**IITG Project Outcomes Form - Report Outcomes : Entry # 747****Name of person reporting outcomes**

Christopher Badurek

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2018-Cortland-Badurek-Integrating UAS Data and GIS into STEM...

**Have you applied for, or received additional funds? (choose all that apply):**

- Have applied for additional IITG funds to extend this project
- Have applied for campus funds to support this project
- Have applied for support from a private foundation or smaller funding source
- Have received campus funds to support this project

**Access Keywords: Enrollment, Diversity, Capacity, Affordability**

This project increases student access to workforce training that is currently in demand. Many professional workforce development businesses are providing UAS (drone) training to those wanting to enter the field at a very high cost. This project has provided students with this training at a SUNY tuition cost and also for traditional credits. The curriculum for drone training is based on content from the FAA and certified drone pilots are in demand in industry. The project overall has provided significant career opportunities for students who pursue careers at the intersection of GIS and UAS (drone) operation.

**Completion Keywords: Completion, Persistence, Transfer, Retention**

This project supported progress to degree completion by increasing interest and motivation in GIS careers. The course surveys I conducted indicated significant increase in interest in UAS careers and in the application of UAS/drones into GIS practice (see attached file). This increase and motivation to learn more about drone use also helps students to maintain motivation to complete their GIS degrees in a timely manner. The importance of the Bachelors degree as related to GIS careers was also emphasized by feedback from employers. In addition, several students from my courses had completed AS degrees previously and proceeded to complete their BS degree in GIS.

**Success Keywords: Applied Learning, Student Supports, Financial Literacy, Career Success**

This project increased student experiences with hands-on research as well as career success. Students who participated in this project learned advanced lidar data processing skills as well as advanced image processing skills. Several of these students later participated in SUNY Cortland's Student Research Day in April 2019. In addition, students who participated in the project courses developed advanced GIS skills and application to a variety of uses in STEM and social sciences discipline. Students also practiced skills related to UAS/drone entrepreneurship, giving them additional knowledge of how GIS and drone businesses work. This training helped at least two students be hired into the GIS workforce immediately upon graduation. In addition, the project enabled UAS/drone training as part of the NSF funded Common Problems Pedagogy Project. This endeavor was a joint class experience for students from Economic (Political Economy of the Adirondacks) and Geography (Environmental Geography of the Adirondacks) held at Raquette Lake in the Adirondack Park in June 2019. Students trained on drone technology, GIS, and economics to develop a proposal to improve economic opportunity in the area while balancing environmental conservation required by Adirondack Park regulations. The class was a success and further information is provided in the documents.

**Inquiry Keywords: Scholarship, Discovery, Innovation, Mentoring**

This project increased student experiences with student research as well as applied practice in entrepreneurship. Several of the students who participated in this project were involved in student research directly under the PI's mentoring or with another SUNY Cortland professor's mentorship. Findings from these student research activities were delivered at SUNY Cortland's Student Research Day in April 2019. Students also practiced skills related to UAS/drone entrepreneurship by creating their own drone companies and giving a pitch at the end of semester drone business pitch contest. Students also gave presentations at regional GIS conferences. The PI is also giving presentations at conferences outside of SUNY/CIT this fall. The outcomes of these research projects are provided below.

**Engagement Keywords: START-UP New York, Commercialization, Workforce Development, Alumni/Philanthropic Support, Community Service.**

This project is directly related to start up commercialization as the PI has been in direct contact with Tanya Waite of the SUNYRF to discuss how to bring aspects of drone research and training to the market. The PI visited the SUNY Fredonia Tech Incubator with the SUNYRF staff as well as the Tech Garden technology business incubator in Syracuse to discuss opportunities. The PI is also participating in the S4 -SUNY Startup Summer School Training to help facilitate NSF SBIR grant applications. This project is also foundational to the newly developed SUNY Cortland Institute for Geospatial and Drone Technology. The mission of the institute is to provide community service consultation for GIS and drone services as well as to spark innovation in the commercial sector. The PI serves as Director of Research for the Institute and additional work related to this project will be on-going over the next two years.

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Funds for this project have helped enable the following additional funding activities:

Faculty Grant, \$3,500. Political Economy and Environmental Geography of the Adirondacks. Support from Common Problems Pedagogy Project, PI: Mattingly, B., National Science Foundation, June 2019.

Faculty Grant, \$3,000. Application of Machine Learning Techniques to GIS and Drone Imagery. Fine Teaching Development Award, Faculty Development Center, SUNY Cortland, April 2019.

Research Grant, \$200,000. Institute for Geospatial and Drone Technology. Downtown Redevelopment Initiative, New York State and SUNY Cortland, July 2018. PI: Miller, W., Co-PI: Duryea, D., and Badurek, C.A. June 2019-June 2021.

Research Grant, \$9,700. Integrating UAS Data and GIS into STEM and Social Science Education. SUNY Innovative Instruction Technology Grant (IITG), State University of New York, July 2018-July 2019.

Equipment Grant, \$4,000. UAS/Drone Hardware and Software. Academic Equipment Replacement Funds, Dean's Office, College of Arts & Sciences, SUNY Cortland, May 2018.

Research Grant, \$3,000. Assessing Impacts of Exurban Development on Land Cover of the Southern Appalachians using GIS Models and UAS. Faculty Research Grants, Office of Research, SUNY Cortland, funded July 2018-July 2019.

Faculty Development Grant, \$365. Turning Drone Data into Information. Faculty Development Center, SUNY Cortland. Drone Curriculum Development, NEGSA, Burlington, VT, funded March 2018.

**1st Choice:**

Discipline Specific Pedagogy

**Discipline Specific Pedagogy**

- Social Sciences
- STEM
- Workforce Development

**2nd Choice:**

Instructional Design

**Instructional Design**

- Course Design/Development/Re-Design
- Student Engagement

**3rd Choice:**

Learning Environments (Physical)

**Learning Environments (Physical)**

- Big Data
- Makerspace (aka Hackerspace)

**What recommendations would you make to scale-up or share your project more broadly (within an educational sector, or perhaps SUNY-wide)?**

The conclusion I have reached from this project is that foundational drone training can successfully be done at minimal cost to institutions. For under \$500, a significant amount of training can be done with hands on training provided to students using low cost 'training drones' and use of the SUNY wide ESRI GIS license. To scale-up, I would recommend developing a consortium of interested SUNY institutions to engage in cost share and training in best practices. I would also recommend a study be conducted to learn more about best practices in training for more expensive drone equipment so that SUNY institutions can be informed on how to use funds as conservatively as possible. I also suggest developing an online course covering this material that could be provided for credit or for non-credit professional development as is being done currently by a number of SUNY community colleges.

**If you would like to create a community of practice within the SUNY Learning Commons, please describe "members of your community" who would be most interested in your outcomes. Please be specific (e.g., math faculty, instructional designers, student services, registrars, administrators, accreditation or assessment specialists).**

A GIS community of practice would be ideal for this and related IITG projects. For example, several past and current IITG grants have funded GIS related projects. The PI of this project is also now Co-PI on another IITG project on GIS led by Monroe Community College. Members of this community of practice would include faculty members from a array of disciplines (e.g., geography, biology, geology, computer science, informatics, political sciences, economics, data science). Members might also include instructional designers and those interested in use of GIS for campus resources (e.g, campus planning, facilities management).

**Do you intend to create an ongoing "Community of Practice" within the SUNY Learning Commons to continue work and dialog regarding this project?**

Yes

**Overall, how successful was IITG in meeting your project goals? (You may elaborate on your response in the final question if not addressed elsewhere.)**

Extremely successful

**Do you wish your current abstract to be used?**

Yes

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File One Upload and Brief Description

IITG Project Outcomes, 2018-2019

File One

- [Badurek\\_IITG-Project-Outcomes\\_2018\\_2019.docx](#)

Hyperlinks to journal articles or campus/local/national press releases describing your project

<https://www2.cortland.edu/news/detail.dot?id=cbe41f6c-3099-4bcd-91a6-5d871145165c>

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