MALS 75700: Field Course in Island Long Term Human Ecodynamics

Description from website:
The course is aimed at familiarizing all students with cutting edge interdisciplinary fieldwork that draws on multiple disciplines–combined with active community engagement in local sustainability education efforts in NYC. Students that are interested can also complete this requirement through participation on an approved field school abroad. Ecology and sustainability problems are experienced directly, hands-on, and in a demanding but fully supportive multi-disciplinary field school setting. Sustained fieldwork results in common shared transformative experiences and an enhanced appreciation and understanding of natural ecosystems, traditional ecological knowledge and long-term human interactions with landscape. Students learn, while making a real and direct contribution to global change science.

Course Description:
We live in a digital age in which we are mobile, easily connected to the Internet, and have access to lots of data in the 'cloud' (networks of datacenters connected to the Internet). Geospatial technologies (Geographic Information Systems or GIS, GPS, and remote sensing) are widely used in Earth and environmental sciences and most every discipline in the natural and social sciences. Applications of geospatial technologies can be found extensively in the government, business, and research domains, and are essential for sustainability science research and applications.

This course is designed to introduce graduate students to geospatial technology skill sets that can be employed in a wide variety of geography, social science, and natural resource applications. Learners interact with 21st century technology tools, gain familiarity with GIS, and develop expertise on how to share and disseminate data and analyses. Additionally, students will gain field mapping and surveying techniques extensively used in the environmental and archaeological sciences, as well as many other fields. These include use of GPS, smart phone technologies, unmanned aerial vehicles (UAV) air photography, surveying using real time kinematic (RTK) GPS and total stations. Field data are then brought into GIS for analysis and visualization.

Geospatial technologies are rapidly evolving and are being widely used by the general public for a variety of purposes. Location-based services such as GPS on our smartphones, cameras, or cars are commonplace, as are web-based mapping and social networks with real-time location information. There has been a proliferation of apps and web-based mapping tools; often these are open source and free. These technologies are having an impact on how data are collected, shared, visualized and analyzed. Data collection could involve one or a small group of people working on a short-term project or a large number of people covering a large spatial area for long-term monitoring. Crowdsourcing and citizen science projects are expanding as these and other technologies are becoming available and less expensive.

In addition to learning how to use these technologies and how they are being used by others, the course will explore the impact of the development of geospatial technologies on the individual and society by examining issues such as privacy, social justice, data quality, and surveillance. These are all considerations as we work toward more sustainable social and ecological systems.

Course Structure and Tentative Schedule:
This will be a hybrid (mixture of online and face-to-face meetings) course. Students will meet for 3 face-to-face sessions to learn mapping and surveying techniques (e.g., aerial photography, GPS, RTK GPS, total stations) during the first week of the course for a total of 15 contact hours. The remainder of the class will be online. For online materials we will have a combination of asynchronous and synchronous interactions as we work on the assignments which will take 18-20 hours/week to complete. You will conduct a research project in which you will apply one or more geospatial technology for use in a sustainability topic (e.g., food and water security).

week	topic
1	• May 31, face-to-face meeting: Introduction to course; introduction to geospatial technologies (3 hours); field collection (4.5 hours) • June 1: field day (7.5 hours) • June 2 and June 3 rain date)
2	Basics of map making and spatial analysis; introduction to ArcGIS Online; story maps
3	Basics of geospatial technologies – Geographic Information System (GIS), Global Positioning Systems (GPS), and remote sensing
4	Geospatial Web and user-generated content; citizen science, crowdsourcing, participatory GIS
5	Applications: public health
6	Applications: food and water
7	Societal implications for our digital planet
8	Projects

Note: for the face-to-face and field work, we will meet at Brooklyn College, Ingersoll room 4215.

Objectives of Course:
1. Increase student understanding of how geospatial technologies are used in a variety of contexts with an emphasis on sustainability.
2. Increase student ability to apply mobile and web-based geospatial technologies in sustainability research
3. Interpret geographic patterns using different methods of geographic representation.
4. Expose students to these rapidly changing technologies and how these technologies are impacting individuals, communities, and society.

Expected Learning Outcomes
Upon completion of the course students will be able to:
1. Demonstrate skills in spatial thinking and application of spatial concepts such as pattern, density, proximity, containment and connectivity.
2. Use geospatial technologies to conduct spatial analysis.
3. Discuss how these technologies are impacting research and society

Evaluation:
25%   Active participation in online discussions and reflections
45%   Assignments
30%   Project

Preliminary Bibliography:

Bonney, R., Cooper, C. & Ballard, H., 2016. The theory and practice of citizen science: launching a new journal. Citizen Science: Theory and Practice. 1(1), p.1. DOI: http://doi.org/10.5334/cstp.65

Bonney, R., Phillips, T.B., Ballard, H.L. and Enck, J.W., 2016. Can citizen science enhance public understanding of science?. *Public Understanding of Science*, *25*(1): 2-16.

Cavan, G., T. Butlin, S. Gill, R. Kingston, S. Lindley, 2015. Web-GIS Tools for Climate Change Adaptation Planning in Cities. Handbook of Climate Change Adaptation, Springer, pp 2161- 2191.

Craglia, M., de Bie, K., Jackson, D., Pesaresi, M., Remetey-Fülöpp, G., Wang, C., Annoni, A., Bian, L., Campbell, F., Ehlers, M. and van Genderen, J., 2012. Digital Earth 2020: towards the vision for the next decade. *International Journal of Digital Earth*, *5*(1), pp.4-21.

Delmelle, Eric M., et al. A web-based geospatial toolkit for the monitoring of dengue fever. *Applied Geography* 52 (2014): 144-152.

Den Broeder, L., Devilee, J., Van Oers, H., Schuit, A.J. and Wagemakers, A., 2016. Citizen Science for public health. *Health Promotion International*, p.daw086.

Dunn, C.E. 2007. Participatory GIS – a people's GIS? Progress in Human Geography, 31(5), 616-637.

Elwood, S. and Leszczynski, A., 2011. Privacy, reconsidered: New representations, data practices, and the geoweb. *Geoforum*, *42*(1), pp.6-15.

French, R.A., Parrish, J.K., Phillips, T.B., Ryan, S.F. and Shanley, L.A., 2015. Investing in citizen science can improve natural resource management and environmental protection. *Issues in Ecology*, *19*.

Hackley, M. Citizen Science and Volunteered Geographic Information – overview and typology of participation in Sui, D.Z, Elwood, s. and M.F. Goodchild (eds), 2013/ Crowdsourcing Geographhic Knowledge: Volunteered Geographic Information (VGI) in Theory and Practice. Berlin: Springer. Pp. 105-122 DOI:10.1007/978-94-007-4587-2_7. Lwin, K.K., Y. Murayama, 2011. Web-Based GIS System for Real-Time Field Data Collection Using a Personal Mobile Phone. Journal of Geographic Information System, 2011, 3, 382-389.

McKinley, D.C., Miller-Rushing, A.J., Ballard, H.L., Bonney, R., Brown, H., Evans, D.M.,

See, L., Mooney, P., Foody, G., Bastin, L., Comber, A., Estima, J., Fritz, S., Kerle, N., Jiang, B., Laakso, M. and Liu, H.Y., 2016. Crowdsourcing, citizen science or volunteered geographic information? The current state of crowdsourced geographic information. *ISPRS International Journal of Geo-Information*, *5*(5), p.55.

Singh, P.S., Chutia, D. and Sudhakar, S., 2012. Development of a web based GIS application for spatial natural resources information system using effective open source software and standards. *Journal of Geographic Information System*, *4*(3), p.261.

Zhang, Y., McBroom, M.W., Grogan, J. and Blackwell, P.R., 2013. Crowdsourcing with ArcGIS online for natural resources management