Term Information

Effective Term	Spring 2021

General Information

Course Bulletin Listing/Subject Area	Geography
Fiscal Unit/Academic Org	Geography - D0733
College/Academic Group	Arts and Sciences
Level/Career	Graduate
Course Number/Catalog	6020
Course Title	Foundations of Data-Driven Sustainable Energy Systems
Transcript Abbreviation	FndDataDrvSusEngSy
Course Description	Introduction to issues impacting sustainable energy systems across technology, law and policy, business models, resilience, data, geospatial, and decision sciences.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Prereq: Enrollment in Data-Driven Sustainable Energy Systems Graduate Interdisciplinary Specialization or permission of instructor.
Exclusions	Not open to students with credit for AEDECON 6500, ENVENG 6020, FABE 6020, ISE 6020, or PUBAFRS 6020
Electronically Enforced	Yes

Cross-Listings

Cross-Listings	Cross-listed with AEDECON 6500, ENVENG 6020, FABE 6020, ISE 6020, and PUBAFRS 6020

Subject/CIP Code

Subject/CIP Code	14.3501
Subsidy Level	Doctoral Course
Intended Rank	Masters, Doctoral

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Students will understand how energy technologies operate individually and within a broader energy system.
- Students will understand how law and public and regulatory policy influence and shape design and function of energy systems and energy system components.
- Students will gain exposure to how the law and public and regulatory policy are shaped by externalities that are associated with energy production.
- Students will understand the heterogeneity in players and market actors across the energy system, and key differences in their business models and practices.
- Students will understand factors that impact resilience of energy systems, role of environmental, social, and economic influences on system resilience, and the impact of energy systems on the resilience of environmental, social, and economic systems
- Students will understand the roles of human and organizational behavior in influencing both supply- and demand-side considerations in energy systems.
- Students will understand how social, environmental, &economic heterogeneity impacts, and is impacted by, energy systems across spatial and organizational scales. Students will assess implications of energy systems on land, water, and resource use.
- Students will learn to conceptualize how to use computational techniques, and find, get, or generate & analyze data to address core research questions in energy systems.
- Students will gain exposure to development & use of computational models of energy systems.

Content Topic List

- Energy System Overview
- Energy Technologies and Components
- Background and History of Energy & Environmental Policy and Legal Foundations and Chevron Deference
- Sustainable Energy Systems: Defining and Assessing Sustainability
- Resilience of Energy Systems, Resilience Theory, and Measurement
- Competition, Deregulation and Reregulation and Policy Instruments: Cap and Trade (Coasean Markets); Taxation; Regulation
- The Energy Transition and Just Transition
- Energy Markets: Principles and Theories and Sustainable Development; Greening of Industry
- Optimization—Based, Computational, Statistical, and Data-Driven Energy-System Modeling, Management, and Analysis
- Demand Side: Behavioral Decision Making; Equity Issues
- Transportation, Land and Water Use, and Energy-System Linkages
- Atmospheric Impacts of Energy Use

Sought Concurrence

Yes

Attachments

- syllabus.pdf: Syllabus (ISE 6020)

  (Syllabus. Owner: Xiao,Ningchuan)

- concurrence.pdf: Concurrence

  (Concurrence. Owner: Xiao,Ningchuan)

Comments

- 08.18.20: Please change the effective term to Spring 2021. The due date for Autumn 2020 had been July 1st. *(by Haddad,Deborah Moore on 08/18/2020 12:20 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Xiao,Ningchuan	08/18/2020 12:12 PM	Submitted for Approval
Approved	Munroe,Darla Karin	08/18/2020 12:12 PM	Unit Approval
Revision Requested	Haddad,Deborah Moore	08/18/2020 12:20 PM	College Approval
Submitted	Xiao,Ningchuan	08/18/2020 12:50 PM	Submitted for Approval
Approved	Munroe,Darla Karin	08/18/2020 12:53 PM	Unit Approval
Approved	Haddad,Deborah Moore	08/18/2020 02:49 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Vankeerbergen,Bernadette Chantal	08/18/2020 02:49 PM	ASCCAO Approval

Autumn 2020

ISE 6020: Foundations of Data-Driven Sustainable Energy Systems

W x.xx-x.xxpm – xxx Building

Professors	Office Hours
Rajiv Ramnath email: ramnath.6@osu.edu	Time: Place: & by appointment
Elena Irwin email: irwin.78@osu.edu	Time: Place: & by appointment
Ramteen Sioshansi email: sioshansi.1@osu.edu	Time: Place: & by appointment

Course Description:

This course introduces students to issues that impact sustainable energy systems (i.e., energy systems that depend on the resilience of natural and human systems and the ability of communities to recover, adapt, and flourish in the face of changing environmental, economic, and social conditions) across seven dimensions: technology, law and policy, business models, resilience, data, geospatial, and decision sciences.

Course Objectives:

As listed below, the course objectives align seven major dimensions that impact sustainable energy systems, to which students are introduced in this course.

Technology: Students will understand how energy technologies operate individually and within a broader energy system.

Law and Policy: Students will understand how the law and public and regulatory policy influence and shape the design and function of energy systems and energy system components. Students will gain exposure to how the law and public and regulatory policy are shaped by externalities that are associated with energy production.

Business Models: Students will understand the heterogeneity in players and market actors across the energy system, and key differences in their business models and practices.

Resilience: Students will understand the factors that impact the resilience of energy systems, the role of environmental, social, and economic influences on system resilience, and the impact of energy systems on the resilience of environmental, social, and economic systems.

Geospatial: Students will understand how social, environmental, and economic heterogeneity impacts, and is impacted by, energy systems across spatial and organizational scales. Students will assess the implications of energy systems on land, water, and resource use.

Decision Sciences: Students will understand the roles of human and organizational behavior in influencing both supply- and demand-side considerations in energy systems.

Computation and Data: Students will understand how to conceptualize how they would use computational techniques, as well as to find, get, or generate and analyze data to address core research questions in energy systems. Students will gain exposure to the development and use of computational models of energy systems.

Course Format:

This class meets once a week for three hours. Most class meetings are formatted as a hybrid lecture/seminar style. Most weeks, the first half of class meetings consist of an organized discussion

of readings that were assigned for that week. The second half of class meetings consist of a guest lecturer or one of the course instructors leading an in-depth discussion of a course topic.

Course Texts:

Required readings[1] are provided in the course outline, which is below.

Course Website:

The class website will be provided via The Ohio State University's Carmen system, which is available at https://carmen.osu.edu/. Students are required to check Carmen regularly for, among other things, course announcements and updates.

Carmen Email Platform: Please **do not** email your instructors through the Carmen email system. Please email them directly through the university email system at the email addresses listed above. Your instructors seldom check the email that is internal to Carmen.

Course Requirements, Grading and Evaluation:

Student course grades will be based upon weekly assignments, which constitute 40% of the course grade, and an end-of-semester group project proposal, which constitutes 60% of the course grade. Most of the weekly assignments are reflections or discussions of weekly readings or lecture topics. In addition, teams of students must provide end-of-semester project proposals, which apply the tools that are covered in the course to studying or designing a sustainable energy systems. For students who are enrolled in the Data-dRIVen sustainable Energy Systems Graduate Interdisciplinary Studies (GIS) Program, the project proposal can serve as the basis of a capstone project in PUBAFRS 8620 (Innovating for Sustainable Energy Systems), which is a required course in the GIS.

Policy on Grading Disputes:

Your instructors understand that grading errors, mistakes, and omissions can occur. To facilitate an orderly and respectful process for the settlement of grading disputes, students must notify the instructors of the dispute in writing within one week of the assignment being returned. The preferred method for submitting grading disputes is email (addresses are provided above). The written correspondence should detail the reason for the dispute and thorough reasoning for the correction that is requested.

Assignment-Submission Protocols:

All assignments must be submitted in-class and on paper at the start of class on the respective due date. Late assignments will receive a letter grade reduction for each day they are late. Exceptions will be given on a case-by-case basis if sufficient grounds are provided. Students coming to class after lecture has begun may still submit their assignments; however, the late penalty will apply. Students are encouraged to come to class and submit their homework assignments on time.

Additionally, if multiple pages are submitted for the same assignment, the pages must be affixed with a staple. This is consistent with professional work habits that are encouraged throughout the University. Submissions affixed by paper clips, "dog ears," chewing gum, or any other *ex post* methodology will be returned to the student and not considered submitted.

Collaboration on Weekly Assignments:

Collaboration on the weekly assignments is welcomed and your instructors do not consider collaboration on these assignments to be a violation of the below policy on originality. Students are permitted to submit collaborative homework assignments in teams not exceeding three students. If a student decides to work with another student, those students must submit a single paper copy of

1 Students are encouraged strongly to stay apprised of current events through regular reading of local and national newspapers, including the Columbus Dispatch, New York Times, Wall Street Journal, *etc*.

the assignments with all partner's names printed clearly on the top of the submission. If students work in partnership or in a trio, the students will all receive the same grade on that homework assignment.

Class Policy on Originality:

Plagiarism is defined as the submission of material authored by another person but represented as the student's own work, whether that material is paraphrased or copied in verbatim or near-verbatim form. This includes the improper acknowledgment of sources in essays or papers. Culpability is not diminished when plagiarism occurs in drafts which are not the final version.

The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Failure to follow the rules and guidelines established in the University's Code of Student Conduct may constitute "Academic Misconduct." Sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

Originality means that the student is the sole author of the work. Thoughts and ideas taken from other sources or from official content are permitted, but this must not constitute the bulk of the student's submission. This means that it is not acceptable for a student simple to submit work completed by another person or institution (such as an online paper purchasing site) and cite it as the source of the work. A student's work must be his or her own. Students are encouraged to see the OSU Code of Student Conduct, Section 3335-23-04 that defines academic misconduct further. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct.

Cases of cheating or academic dishonesty will be reported promptly to COAM. They will be handled according to university policy, which is available at
http://studentaffairs.osu.edu/resource_csc.asp

Other sources of information on academic misconduct (integrity) to which you can refer include:

The Committee on Academic Misconduct web page: http://oaa.osu.edu/coam.html
Ten Suggestions for Preserving Academic Integrity: http://oaa.osu.edu/coamtensuggestions.html
Eight Cardinal Rules of Academic Integrity: www.northwestern.edu/uacc/8cards.html

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact your professor.

Accommodation of Disabilities:

If you would like to request academic accommodations based on the impact of a disability qualified under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, contact your instructor privately as soon as possible to discuss your specific needs. Discussions are confidential.

In addition to contacting the instructor, please contact the Student Life Disability Services at 614-292-3307 or ods@osu.edu to register for services and/or to coordinate any accommodations you might need in your courses at The Ohio State University. Go to http://ods.osu.edu for more information.

Mental-Health Statement:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns

you may be experiencing. If you or someone you know is suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the **Office of Student Life Counseling and Consultation Services (CCS) by visiting https://ccs.osu.edu/ or calling 614-292- 5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614--292--5766 and 24-hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1--800--273--TALK or at https://suicidepreventionlifeline.org/. Also, the OSU Student Advocacy Center is a resource to help students navigate OSU and to resolve issues that they encounter at OSU – visit http://advocacy.osu.edu/.**

Statement on Diversity and Inclusion:

The University promotes a welcoming and inclusive environment for all students and staff, regardless of race, gender, ethnicity, national origin, disability or sexual orientation. There is no tolerance for hateful speech or actions. All violations of this policy should be reported to the University's Bias Assessment and Response Team (https://studentlife.osu.edu/bias/). The University encourages diversity at all levels, particularly among the next generation of colleagues.

Syllabus Revision:

During the course of the semester, your instructors will review student progress, and may revise the syllabus to meet class needs, if necessary. This might also be due to health-related issues of your instructors. This may result in minor changes of due dates, scheduled course content, or deadlines for assignments. Your instructors will make every possible effort to provide advance notice of any changes to the course content or schedule.

Course Schedule:

Week	*Topic(s)*	*Readings*
1	(1) Introduction, (2) Syllabus, and (3) Course Expectations	
2	Energy System Overview (Upstream and Downstream)	Chapter 3 of Section 2: "Options for Resources and Technologies" in Technical Summary (p. 75-91) of GEA, 2012: Global Energy Assessment – Toward a Sustainable Future, Cambridge University Press, Cambridge UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria. Sims-Gallagher et al. (2012) "The Energy Technology Innovation System" Annual Review of Environment and Resources. 37:137–62.
3	Energy Technologies and Components	"Quadrennial Technology Review - An Assessment of Energy Technologies and Research Opportunities." US Department of Energy Report (2015). Tester, et al. Sustainable Energy, Choosing Among Options, 2nd Edition. MIT Press, 2012.
4	(1) Background and History of Energy & Environmental Policy and (2) Legal Foundations and Chevron Deference	Jody Freeman, The Uncomfortable Convergence of Energy and Environmental Law, 41 Harv. Envtl. L. Rev. 339 (2017)
5	Sustainable Energy Systems: Defining and Assessing	Chapters 1-2 of Section 2: Technical Summary (p. 42-70) in GEA, 2012: Global Energy Assessment – Toward a Sustainable Future, Cambridge University Press,

	Sustainability	Cambridge UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria. Chu, S. and A. Majundar “Opportunities and Challenges for a Sustainable Energy Future” Nature (2012) 488.7411: 294-303. McCollum et al. (2011). "An Integrated Approach to Energy Sustainability" Nature Climate Change, 1, 428-429. Building a Sustainable Energy Future National Science Foundation (2009). Bielicki et al (2011) "Grand Challenges in Energy Sustainability." Chapter 4 in BERAC. 2010. Grand Challenges for Biological and Environmental Research: A Long-Term Vision; A Report From the Biological and Environmental Research Advisory Committee March 2010 Workshop, DOE/SC-0135, BERAC Steering Committee on Grand Research Challenges for Biological and Environmental Research.
6	Resilience of Energy Systems, Resilience Theory, and Measurement	Staid, A., Guikema, S.D., Nateghi, R. et al. Simulation of tropical cyclone impacts to the U.S. power system under climate change scenarios. Climatic Change 127, 535–546 (2014). Marchese, Reynolds, Bates, et. al. (2018) Resilience and sustainability: Similarities and differences in environmental management applications. Science of the Total Environment. 613–614 (2018).
7	(1) Competition, Deregulation and Reregulation and (2) Policy Instruments: Cap and Trade (Coasean Markets); Taxation; Regulation	Wagner. But Will the Planet Notice? How Smart Economics Can Save the World, Hill and Wang, 2011. “Quadrennial Energy Review: Second Installment.” US Department of Energy Report (2017). Averch, Harvey; Johnson, Leland L. (1962). "Behavior of the Firm Under Regulatory Constraint". American Economic Review. 52 (5): 1052–1069. Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use. National Academy of Sciences 2010. Chapter 5 of Section 2: Policy Tools and Areas of Intervention” in Technical Summary (p. 75-91) of GEA, 2012: Global Energy Assessment – Toward a Sustainable Future, Cambridge University Press, Cambridge UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria.
8	The Energy Transition and Just Transition	McCauley, D., Ramasar, V., Heffron, R. J., Sovacool, B. K., Mebratu, D., & Mundaca, L. (2019). Energy justice in the transition to low carbon energy systems: Exploring key themes in interdisciplinary research. Applied Energy. 233–234, 916–921

		Bazilian, Morgan, Michael Bradshaw, Andreas Goldthau, and Kirsten Westphal. (2019): "Model and manage the changing geopolitics of energy." Nature. 29-31. Haggerty, J. H., Haggerty, M. N., Roemer, K., & Rose, J. (2018). Planning for the local impacts of coal facility closure: Emerging strategies in the US West. Resources Policy, 57, 69-80. White, L.V., & Sintov, N.D. (2019). Health and financial impacts of demand-side response differ across sociodemographic groups. Nature Energy.
9	(1) Energy Markets: Principles and Theories and (2) Sustainable Development; Greening of Industry	Murray, Barrie. Power markets and economics: energy costs, trading, emissions. John Wiley & Sons, 2009. Paine, N., Homans, F., Pollak, M., Bielicki, J., and Wilson, E., (2014). “Why Rules Matter: Optimizing Pumped Hydroelectric Storage Under Different ISO Markets.” Energy Economics, 46, 10-19. UN Sustainable Development Goals. Riahi, K., F. Dentener, D. Gielen, A. Grubler, J. Jewell, Z. Klimont, V. Krey, D. McCollum, S. Pachauri, S. Rao, B. van Ruijven, D. P. van Vuuren and C. Wilson, 2012: Chapter 17 - Energy Pathways for Sustainable Development. In Global Energy Assessment - Toward a Sustainable Future, Cambridge University Press, Cambridge, UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria, pp. 1203-1306.
10	Optimization-Based Energy-System Modeling, Management, and Analysis	R. Sioshansi and A. J. Conejo. Optimization in Engineering: Models and Algorithms, Vol 120 of Springer Optimization and Its Applications series. Springer International Publishing, Cham, Switzerland, 2017. Middleton, R., and Bielicki, J. (2009). “A Scaleable Infrastructure Model for Carbon Capture and Storage: SimCCS.” Energy Policy, 37, 1052-1060.
11 & 12	Computational, Statistical, and Data-Driven Energy-System Modeling, Management, and Analysis	Sections from Garrett Grolemund and Hadley Wickham (2017), *R for Data Science* (First Edition), O’Reilly; Prepared case studies on the use of computational and data-analytic techniques for energy system modeling, management, and analysis. Wang, Y., Bielicki, J. (2018). “Acclimation and the Response of Hourly Electricity Loads to Meteorological Variables.” Energy, 142, 473-485.
13	Demand Side: Behavioral Decision Making; Equity Issues	Energy for the Poor: Underpinning the Millennium Development Goals Department for International Development, United Kingdom, August 2002. Zhang, N. et al. (2019) Comparison of three short-term load forecast models in Southern California. Energy:

		189, 116358. Shahzeen Z. Attari, Michael L. DeKay, Cliff I. Davidson, and Wändi Bruine de Bruin Proceedings of the National Academy of Sciences September 14, 2010 107 (37) 16054-16059 Sintov, N.D. & Schultz, P.W. (2015). Unlocking the potential of smart grid technologies with behavioral science. Frontiers in Psychology, 6.
14	Transportation, Land and Water Use, and Energy-System Linkages	Y. Qin, L. Höglund-Isaksson, E. Byers, K.S. Feng, F. Wagner, W. Peng, and D. L., Mauzerall (2018), Air Quality-Carbon-Water Synergies and Trade-offs in China's Natural Gas Industry. Nature Sustainability 1 (9): 501-508. Trainor AM, McDonald RI, Fargione J (2016) Energy Sprawl Is the Largest Driver of Land Use Change in United States. PLoS ONE 11(9):e0162269. Jacquet, J.B. (2015) "The Rise of 'Private Participation' in the Planning of Energy Projects in the Rural United States", Society & Natural Resources, 28:3, 231-245,
15	Atmospheric Impacts of Energy Use	Beyond Smoke and Mirrors: Climate Change and Energy in the 21st Century, Cambridge University Press, 2010. D. Tong, Q. Zhang, Y.X. Zheng, K. Caldeira, C. Shearer, C.P. Hong, Y. Qin, and S. J. Davis (2019), Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target. Nature 572, 373-377. Deng, H., Bielicki, J., Oppenheimer, M., Fitts, J., and Peters, C. (2017). "Leakage Risks of Geologic CO2 Storage and the Impacts on the Global Energy System and Climate Mitigation." Climatic Change, 144(2), 151-163. Jackson et al (2017) "Focus on Negative Emissions." Environmental Research Letters, 12(11).

FW: NRT GIS and Foundations Course

Irwin, Elena <irwin.78@osu.edu>
Tue 2020-01-21 10:27

To: Sioshansi, Ramteen <sioshansi.1@osu.edu>
Cc: Quiring, Steven M. <quiring.10@osu.edu>

Ramteen: Here is the concurrence from AEDE. Please let me know if you need anything else right now. Thanks Elena

-----Original Message-----
From: Roe, Brian <roe.30@osu.edu>
Sent: Tuesday, January 21, 2020 9:53 AM
To: Irwin, Elena <irwin.78@osu.edu>; Haab, Timothy <haab.1@osu.edu>; Parkman, Anna <parkman.6@osu.edu>
Subject: RE: NRT GIS and Foundations Course

Elena,

The AEDE Committee on Academic Affairs has approved concurrence for this course.

Best,

Brian
Brian E. Roe
VanBuren Professor
Agricultural, Environmental and Development Economics Leader, Ohio State Food Waste Collaborative Ohio State University

-----Original Message-----
From: Irwin, Elena <irwin.78@osu.edu>
Sent: Sunday, January 12, 2020 8:19 PM
To: Roe, Brian <roe.30@osu.edu>; Haab, Timothy <haab.1@osu.edu>; Sohngen, Brent <sohngen.1@osu.edu>; Klaiber, Allen <klaiber.16@osu.edu>
Subject: RE: NRT GIS and Foundations Course

All: A few clarifications, and attaching the syllabus again for your convenience:

1. Provided you are in agreement, this will be cross-listed with AEDE along w Glenn, Geography and ISE (Integrated Systems Eng). We are under a time constraint (end of this month!) that makes it more expedient to propose it initially as an ISE course, and then to circle back to revising it to be cross-listed with these

other departments including ours once it gets approved. In any case, the intent is for it to be cross-listed by the time it hits the books for Fall 2020 offering.
2. It will be 6000 level, unless someone pushes for a higher level, but it won't be lower than that -- therefore, it won't compete with undergrad courses.
3. This will be open to any students meeting pre-requisites, which will likely be "Enrollment in the GIS or instructor permission." To be enrolled in the GIS students have to have graduate student standing and will have to have some kind of STEM background, i.e., in science, math, eng, econ, or other science or quant field.
4. Currently I am listed as a co-instructor. I view that as a placeholder. If there is interest from anyone in AEDE to co-teach this, thinking obviously of Brent or perhaps YY, that would be fine, and in fact greatly preferred given that I am not an energy economist. I am really just trying to catalyze this, given my SI role, but also want to be sure this is something the department would see as a value add.

Again, we are asking for a concurrence from AEDE for this course (and soon, will be asking for concurrence for the GIS). Please let me know if I can provide any other details, thank much

Elena

-----Original Message-----
From: Irwin, Elena
Sent: Thursday, January 9, 2020 2:32 PM
To: Roe, Brian <roe.30@osu.edu>; Haab, Timothy <haab.1@osu.edu>; Sohngen, Brent <sohngen.1@osu.edu>; Klaiber, Allen <klaiber.16@osu.edu>
Subject: FW: NRT GIS and Foundations Course

Hi All: I am working w a team of faculty to develop an interdisciplinary research traineeship (NRT) graduate program in sustainable energy systems. This program will be open to all STEM students, including AEDE, and there will be some one-year fellowship opportunities (competitive) to support students enrolled in the program. My hope is that a few of these can flow to AEDE and that we'll be able to attract and support some strong students w this interest.

We are currently in the first year of developing the program. As part of this, we are proposing a Graduate Interdisciplinary Specialization (GIS) in sustainable energy systems that will consist mainly of existing 5000 and above courses (you may recall me emailing about some of the AEDE courses, which we plan to include provided the dept approves) and developing two new courses: (1) a foundation course that is intended to introduce students to energy systems and to issues that impact sustainable energy systems along across seven major dimensions: technology, policy, business models, resilience, data, geospatial, and decision sciences. And (2) a capstone course that will be focused on project-based research w industry partners.

An initial draft of the foundations course syllabus is attached. This course needs to be approved by end of the month, including all concurrences. Can you take a look

and let me know if you see any issues or problems in terms of concurrence?

I will also get the description of the GIS to you in the near future, which will also require concurrence.

Happy to talk more about this if helpful.

Thanks
Elena

Concurrence for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems

Quiring, Steven M. <quiring.10@osu.edu>

Tue 2020-01-21 16:57

To: Sioshansi, Ramteen <sioshansi.1@osu.edu>

Ramteen,

In my role as Grad Chair of the Atmospheric Sciences Program, I am pleased to report that our program supports the proposal for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems.

Regards,
Steven

Steven M. Quiring Professor
Atmospheric Sciences Program, Department of Geography
1124 Derby Hall, 154 North Oval Mall, Columbus, OH 43210
614-247-8222 Office / 614-292-6213 Fax
quiring.10@osu.edu geography.osu.edu

Fwd: Re: Please read - Concurrence on Foundations course for NRT

Ramnath, Rajiv <ramnath.6@osu.edu>
Wed 2020-01-22 08:09

To: Sioshansi, Ramteen <sioshansi.1@osu.edu>

1 attachments (26 KB)
Syllabus-Foundations-2020-01-21.docx;

Hi Ramteen, See below. Regards, Rajiv

-------- Forwarded Message --------
Subject: Re: Please read - Concurrence on Foundations course for NRT
Date: Tue, 21 Jan 2020 22:24:42 -0500
From: Teodorescu, Radu <teodores@cse.ohio-state.edu>
To: Ramnath, Rajiv <ramnath.6@osu.edu>
CC: Qin, Feng <qin.34@osu.edu>, Teodorescu, Radu <teodores@cse.ohio-state.edu>, Sivilotti, Paul <paolo@cse.ohio-state.edu>, Wenger, Rephael <wenger.4@osu.edu>

Hi Rajiv!

On behalf of the CSE Curriculum Committee I am happy to provide concurrence to ISE offering the "Foundations of Data-Driven Sustainable Energy Systems" class, as outlined in the attached syllabus.

—Radu

—

Radu Teodorescu
Associate Professor
Computer Science and Engineering
The Ohio State University
(614) 292-7027
teodores@cse.ohio-state.edu arch.cse.ohio-state.edu

From: Ramnath, Rajiv <ramnath.6@osu.edu>
Sent: Tuesday, January 21, 2020 7:56 AM
To: Qin, Feng <qin.34@osu.edu>
Subject: Please read - Concurrence on Foundations course for NRT

Hi Feng,

Anyway, if you remember we recently won an NRT award, in collaboration with ISE, ECE and units from ASC. The syllabus for the Foundations course for that program is attached, which includes updates by us (me after a brief discussion with Srini, Raghu and Anish - these three because of the data analytics and sensing relevance). Ramteen Sioshansi is asking if we might be able to provide a short note of concurrence by this afternoon, in order to send it to CCAA tomorrow. I believe there shouldn't be any issue with that, because the CS component is just 1 2-class module out of several and a CSE person (me, for now) will be one of the instructors and coordinators. All he needs is a short email, template below:

Hi Ramteen,

The Department of Computer Science and Engineering is happy to provide concurrence for the Foundations of Data-Driven Sustainable Energy Systems course syllabus and look forward to partnering in the new Graduate Interdisciplinary Specialization.

Rob

...

Let me know either way, and thanks!

Regards,

Rajiv

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Dr. Rajiv Ramnath ramnath.6@osu.edu
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<Syllabus-Foundations-2020-01-21.docx>

Fw: NRT GIS and Foundations Course

Bielicki, Jeff <bielicki.2@osu.edu>
Thu 2020-01-09 08:58

To: Sioshansi, Ramteen <sioshansi.1@osu.edu>
Cc: Irwin, Elena <irwin.78@osu.edu>

Here's the concurrence from Glenn.

I'll reply to Rob's email in a separate email.

Cheers,
Jeff

Jeffrey M. Bielicki, Ph.D.
Associate Professor
Faculty Lead, Sustainable Energy, OSU Sustainability Institute
The Ohio State University
College of Engineering Dept. of Civil, Environmental, and Geodetic Engineering
483b Hitchcock Hall, 2070 Neil Avenue, Columbus, OH 43210
John Glenn College of Public Affairs
210p Page Hall, 1810 College Avenue, Columbus, OH 43210
614-688-2131 (Engineering) | 614-688-2113 (Glenn College)
email: bielicki.2@osu.edu | website: u.osu.edu/bielicki.2

From: Greenbaum, Robert <greenbaum.3@osu.edu>
Sent: Thursday, January 9, 2020 8:54 AM
To: Bielicki, Jeff <bielicki.2@osu.edu>
Cc: Hallihan, Kathleen <hallihan.3@osu.edu>; Adams, Christopher <adams.615@osu.edu>; Landsbergen, David <landsbergen.1@osu.edu>; Moulton, Stephanie <moulton.23@osu.edu>
Subject: RE: NRT GIS and Foundations Course

Hi Jeff,

The Glenn College is happy to provide concurrence for the Foundations of Data-Driven Sustainable Energy Systems course syllabus and look forward to partnering in the new GIS.

Given the rigor of the class (many of the assignments are reflections), we would suggest listing the class at the 5000-level. That also makes the most sense if it is to be used as a recommended prerequisite class for the Rapid Innovation for Public Impact class.

Rob

THE OHIO STATE UNIVERSITY

Robert T. Greenbaum
Professor, Associate Dean for Curriculum
John Glenn College of Public Affairs
350E Page Hall, 1810 College Road, Columbus, OH 43210
614-292-9578 Office / 614-292-2548 Fax
greenbaum.3@osu.edu glenn.osu.edu/faculty/glenn-faculty/greenbaum/

From: Bielicki, Jeff <bielicki.2@osu.edu>
Sent: Wednesday, January 8, 2020 4:50 AM
To: Greenbaum, Robert <greenbaum.3@osu.edu>
Subject: Fw: NRT GIS and Foundations Course

Here's the most recent draft of the syllabus.

Thanks!

Jeffrey M. Bielicki, Ph.D.
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From: Sioshansi, Ramteen <sioshansi.1@osu.edu>
Sent: Monday, January 6, 2020 9:23 PM
To: Irwin, Elena; Bielicki, Jeff; Quiring, Steven M.; Newton, Elizabeth K.
Subject: Re: NRT GIS and Foundations Course

Hi everyone,

As promised/threatened, attached is a revised draft course syllabus, based on Noah's draft. I tried to fit-in some edits, based on various conversations and email exchanges that I've been privy to over the past month or so. However, I'm sure that this could use some non-trivial edits.

Things that I need suggestions/comments on very much are as follows.

1. What do we think is an appropriate "level" for this course? It needs to be at least 5000-level to count towards the GIS.

2. What is missing in terms of content in the course outline?

3. What are some illustrative readings that we can put into the course outline?

Given the tight deadline on getting this to CCAA (I've been told by Carolyn that she needs everthing, including concurences, by 27 January), I would appreciate comments by the end of the day on Wednesday.

Best regards,
ramteen

On Mon, 6 Jan 2020 at 15:33, Sioshansi, Ramteen wrote:

From: "Sioshansi, Ramteen" <sioshansi.1@osu.edu>
To: "Irwin, Elena" <irwin.78@osu.edu>, "Bielicki, Jeff" <bielicki.2@osu.edu>,
"Quiring, Steven M." <quiring.10@osu.edu>,
"Newton, Elizabeth K." <newton.387@osu.edu>
Cc: "Sioshansi, Ramteen" <sioshansi.1@osu.edu>
Date: Mon, 6 Jan 2020 15:33:00
Subject: NRT GIS and Foundations Course

Hi everyone,

I'm sorry to start off your semester with bad news, but such is life. I got an e-mail from Noah yesterday informing me that he is dropping-out of the NRT project entirely. This places us in an extremely tight position, as we need to pickup the pieces and get the proposal for the GIS foundations course together in two weeks, while also putting together our GIS proposal. To get this done, I need help from all of you with a few things.

GIS Foundations Course
First of all, we're going to change strategies with the course-approval process. My current plan is to put it forward as an ISE course, meaning that we need only to go through the College of Engineering Committee on Academic Affairs. Once the course is approved, we can submit a course-modification request to cross-list it with GEOG, PUBAFFRS, and AEDE (which was the original set of cross listings that we discussed). I talked to my department's representative on the College Committee on Academic Affairs (Carolyn Sommerich), and this is the strategy that she recommended.

Our deadline to have the course proposal together is in about two weeks (I'm waiting for Carolyn to give me the exact date when we need to get everything to her). My plan for doing this is to use the syllabus that Noah drafted as a starting point, fill-in remaining topics that I think needs to be included in course coverage, and put the proposal together. I need a couple of things from you to get this done.

1. I'll go through the draft syllabus tonight, clean it up, and send it you to review. I need comments on topics that need to be covered in the course that appear to be missing from the syllabus. Please get these to me by Wednesday at the latest, as I want to send it out to the full project team one more time to get any lingering feedback on it.

2. Carolyn suggested that we get concurrence letters/emails from AEDE, GEOG, and PUBAFFRS for our course proposal. Elena, Steven, and Jeff and Liz, can you please grease the wheels to try and get these for us? I can draft language for the concurrent letters/emails if your curriculum committees want it.

GIS Proposal
I do not know, as of yet, what we need to get our GIS proposal together. I'm meeting with Gina Jaquet later in the week to go over the documents that we have collected thus far and what the graduate school needs for a GIS proposal. I will almost certainly be back by the end of the week asking for favors, so stay tuned. My guess is that this will be very time-sensitive as well.

"Happy" new year to you all,
ramteen

Fw: Concurrence for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems

Quiring, Steven M. <quiring.10@osu.edu>
Fri 2020-01-24 12:46
To: Sioshansi, Ramteen <sioshansi.1@osu.edu>

Steven M. Quiring Professor
Atmospheric Sciences Program, Department of Geography
1124 Derby Hall, 154 North Oval Mall, Columbus, OH 43210
614-247-8222 Office / 614-292-6213 Fax
quiring.10@osu.edu geography.osu.edu

From: Munroe, Darla <munroe.9@osu.edu>
Sent: Wednesday, January 22, 2020 9:38:51 AM
To: Quiring, Steven M. <quiring.10@osu.edu>
Subject: Re: Concurrence for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems

Hi Steven,

I don't see any issues, provided you and Yue consult a little bit so her course is complementary.

I would send to E&S geographers, or all human, when in doubt.

Thanks, this will be a great addition to campus, agreed!

Darla

—

Darla K. Munroe, PhD
Professor and Chair
Faculty Advisory Board, Sustainability Institute
Editor in Chief, *Journal of Land Use Science*
Scientific Steering Committee, Global Land Programme

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From: "Quiring, Steven M." <quiring.10@osu.edu>
Date: Tuesday, January 21, 2020 at 4:55 PM
To: "Munroe, Darla" <munroe.9@osu.edu>
Subject: Re: Concurrence for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems

Hi Darla,

Please let me know if you see any issues with this course. I wasn't sure if I should send this to you or Ningchuan?

Both ASP and GEOG will be listed as potential doctoral programs for the doctoral trainees, so I plan to provide a concurrence email on behalf of ASP and I guess Ningchuan could provide one on behalf of GEOG.

Thanks,
Steven

From: "Quiring, Steven M." <quiring.10@osu.edu>
Date: Monday, January 20, 2020 at 9:12 AM
To: "Munroe, Darla" <munroe.9@osu.edu>
Subject: Concurrence for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems

Hi Darla:

Please find attached a course proposal for ISE 6XXX: Foundations of Data-Driven Sustainable Energy Systems. This is a new course that is being developed by the faculty in the EmPOWERment NRT. This is a required course for all doctoral trainees who are part of the program and will be taught annually in the fall.

The PI (Ramteen Sioshansi; sioshansi.1@osu.edu) has asked me to assist in getting concurrence from Geography.

I encourage our department to support this course because the NRT program has the potential to enhance the quality of our graduate program by recruiting and supporting students with interests in energy systems. There are numerous faculty in our department whose research is synergistic and who could potentially benefit. We will start actively recruiting PhD students next year and the NRT program will be able to provide fellowships to support students for at least 1 year.

I have been working hard to get a lot of geography classes included in the electives for the NRT program (see attached list). I have provided some input on the syllabus and included some readings from article written by Yue Qin and my grad students. I expect that this syllabus will evolve over time,

so comments are welcome, but at this point we are mainly trying to get the class approved so that it can be on the books in fall.

If Geography is willing to support this proposal, please send me and Ramteen and email to this effect. He needs to submit this course proposal this week.

Please call me if you have any questions.

Thanks,
Steven

THE OHIO STATE UNIVERSITY

Steven M. Quiring Professor
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